METAL INDUSTRY

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ALUMINUM WORLD ⚓ COPPER AND BRASS

BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

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ELECTRO-PLATERS REVIEW

Vol. 32 NEW YORK, MAY, 1934 No. 5

Press Casting Brass and Other Copper Base Alloys

By CHARLES PACK

Pack-Morin, Inc., New York

An Outline of the Progress that Has Been Made in this New Art by Brass Mills, Die Casting Manufacturers and Users of Castings

CHARLES PACK

EARLY in 1930, the writer first pointed out the fact that brass and other copper base alloys were successfully being press cast, or die-cast throughout Europe, in Soviet Russia and even in Japan.[1] At that time, the writer exhibited many samples of brass parts produced in Europe by the press casting method on a machine developed by Joseph Polak in Prague, Czecho Slovakia. Polak referred to the product of his machine as "Pressguss" or "Press Castings." Early in 1932, the writer described the "Press Casting" process in general and the Polak machine in particular.[2]

[1]Symposium on Developments in Automotive Materials, American Society for Testing Materials, March 19, 1930, Charles Pack on "Die Cast Metals for Automotive Use."

At this time, there are more than 100 brass casting machines in operation throughout Europe, 28 machines in Soviet Russia and 15 machines in one plant in Japan. Brass press castings are being produced commercially in England, Germany, France, Italy, Switzerland, Sweden, Czecho Slovakia, and Belgium.

Although pressure casting is essentially an American process which thrives on mass production and although this country is recognized as the leader in mass production methods, the volume of brass pressure castings produced in this country at this time is less than that produced in any of the above named foreign countries. This condition can be partly attributed to the business depression which has led to an unwillingness on the part of American manufacturers to invest capital in new methods and processes.

The development of the brass press casting process has further been retarded in this country due to the fact that competitive products such as the zinc base die casting, the screw machine product and stampings are probably developed to a finer degree in this country than they have been abroad.

Brass press castings come logically within the scope of the die casting manufacturer, but the process has attracted the interest of three classes of manufacturers, in this country. They are:

A. Brass Mills
B. Die Casting Manufacturers
C. Users of Castings

The writer will attempt to outline, briefly, the prog-

[2]Charles Pack—"Press Casting," Metal & Alloys, March, 1932.

ress that has been made in the art of pressure casting brass in these fields.

Brass Mills

The American Brass Company was the first brass company to recognize the economic aspect of the brass press casting and for the past four years, W. H. Basset, J. R. Freeman, Jr. and the American Brass Company's laboratories have contributed largely to the development of this process. Two types of machines

Fig. 1. Brass Press Castings Produced by the American Brass Company

are being used by the American Brass Company; they are:

(a) Polak Machine
(b) Pack Machine

These machines are described in detail, later in this paper.

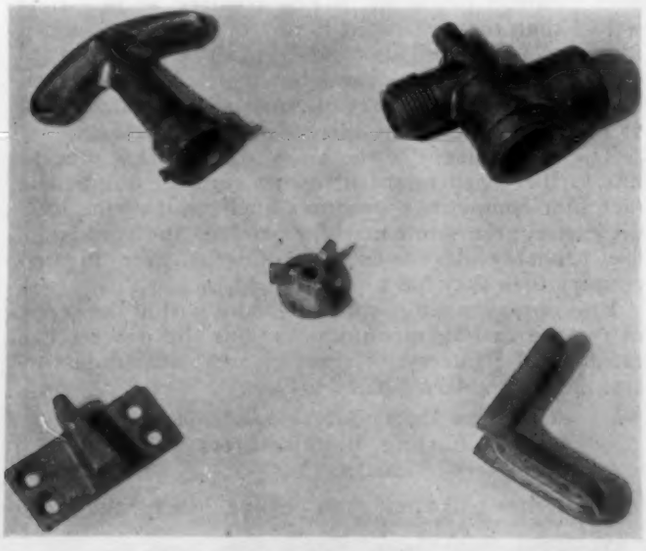


Fig. 2. Brass Press Castings Produced by the American Brass Company

In Figs. 1 and 2 are shown a number of brass press castings produced by the American Brass Company.

Another leading brass mill has recently installed a new type of brass press casting machine which was designed by Mr. Walter P. Sherman and which is also described later in this paper.

The Titan Brass Company of Bellefonte, Pa., was the first company in this country to adopt the Polak machine and this company is now operating a number of these machines. Many illustrations of the Titan product, together with details of their plant practice is given in a recent paper by William W. Sieg.[3]

Die Casting Plants

The Doehler Die Casting Company is the only producer of die castings in this country that has extended the die-casting art to the copper base alloys and this company is now operating five brass machines in their plant at Batavia, N. Y.

The Doehler Company state that they are making steady and consistent progress in the die-casting of brass and that they are gradually increasing the capacity of this department of their business.

Users of Castings

The plumbing trade is a large user of brass parts and it is reasonable to assume that the brass press casting would find extensive application in this industry. The Kohler Company of Kohler, Wis., have been producing brass press castings, on the Pack machine, for a period of over two years. A typical example of a brass casting is shown in Fig. 3, which is a photograph of a sink trap bowl approximately

Fig. 3. Sink Trap Bowl Casting Produced by Kohler of Kohler

6" in diameter. More than 50,000 of these bowls have been produced by the Kohler Company and a large variety of other brass parts have also been produced by this company.

BRASS PRESS CASTING MACHINES

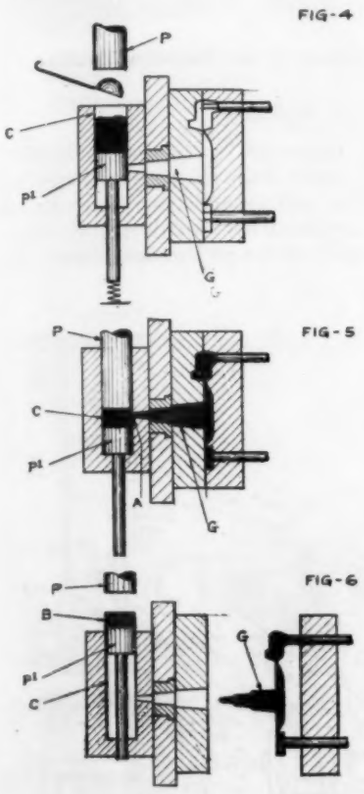
Polak Machine

The Polak machine has been described by the writer and also by Sieg in the papers referred to above. The principles underlying the operation of this machine are illustrated in Figs. 4, 5 and 6. The brass, preferably in a semi-molten state, is poured into the cup "C" and in Fig. 4 is shown the two members of the die, in casting position, ready to receive the charge of metal. Two plungers are used in this machine, the

[3]William W. Sieg, "Brass Pressure Castings Are Produced Economically,"—Iron Age, November 30, 1933.

upper plunger P and the lower plunger P. It will be noted, that the position of the lower plunger P^1, in Fig. 4 is such as to prevent the metal from flowing into the die by gravity.

When pressure is applied to the upper plunger "P", the first effect of this pressure is to force the plunger P^1 downward, which permits the metal to be forced into the die through the gate "G" as shown in Fig. 5. When the plunger P is retracted and pressure is applied to the plunger P^1, it causes the gate to be sheared at the point "A" (Fig. 5) and the portion of



Figs. 4, 5 and 6. Casting Principle of the Polak Machine

the gate "B" (Fig. 6) is ejected from the cup. The remainder of the gate "G" remains with the castings and is ejected from the die as shown in Fig. 6. The opening and closing of the die as well as the operation of the plungers on the Polak machine is effected by means of hydraulic power.

The Polak machine is produced in three sizes and the speed of operation ranges from 100 to 250 shots per hour, depending upon the size and complexity of the job.

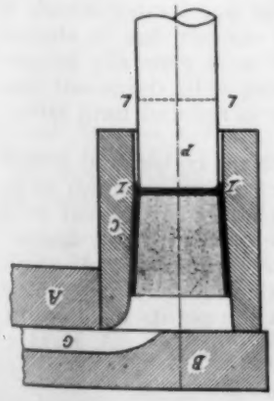


Fig. 7. Casting Principle of the Pack Machine

Pack Machine

The principle underlying the operation of the Pack machine is shown in Fig. 7. Here, the brass is poured into the cup "I" which is mounted in a suitable press. The die is then closed and during this period of closing, the metal is permitted to chill in a cup form as shown by the heavy inked portion of the sketch. The plunger "P" is then forced upwards, raising the chilled metal cup until it hits the upper member of the die "B" which causes the chilled cup to collapse and forces the molten, or semi-molten metal from the inside of the cup, to flow into the die cavity through the gate "G". With this machine, the entire gate is attached

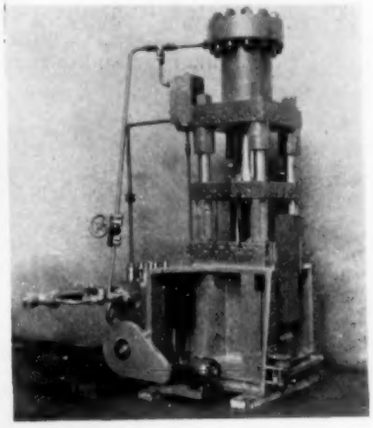
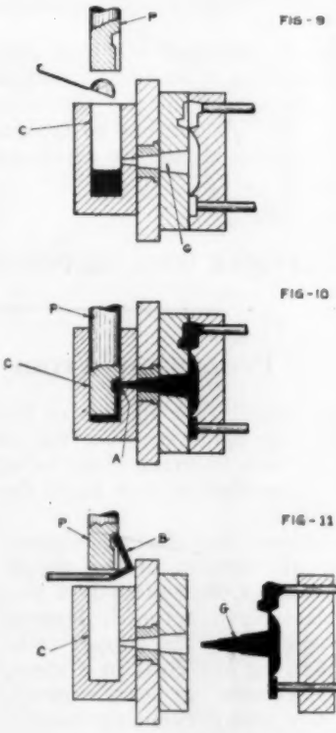


Fig. 8. Pack Machine Installed at the American Brass Company, Waterbury, Conn.

to the casting when it is withdrawn from the die and the gate is removed from the casting after cooling. A photograph of the latest Pack machine as installed in the plant of the American Brass Company is shown in Fig. 8.



Figs. 9, 10 and 11. Casting Principle of the Sherman Machine

Sherman Machine

The principle underlying the operation of the Sherman machine is illustrated in Figs. 9, 10 and 11.

The Sherman machine may be considered as a

natural simplification of the Polak machine. In the latter machine, two plungers are required. It is quite evident that the elimination of one of these plungers would tend to simplify the operation of the machine and reduce maintenance charges. Sherman accomplishes this result in the following manner.

The plunger "P" (Fig. 9) is provided with an undercut. The metal is poured into the cup "C" and when pressure is applied to the plunger "P", the metal is forced past a groove in the plunger and into the die, through the orifice "A" (Fig. 10). When the plunger "P" is retracted, it causes the gate to shear at the point "A" (Fig. 10), the portion of the gate "B" (Fig. 11) remaining on the plunger until it reaches its upward position at which time, it is automatically ejected from the plunger. The remainder of the gate "G" (Fig. 11) adheres to the castings, as in the Polak machine and is removed from the castings after cooling.

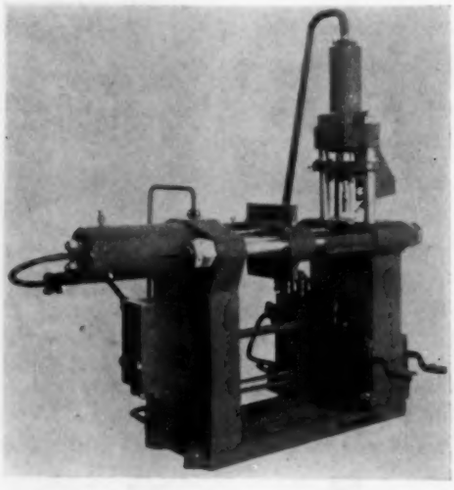


Fig. 12. The Sherman Machine

The Sherman machine is operated by hydraulic power and the speed of operation is similar to that of the Polak machine. A photograph of the Sherman machine is shown in Fig. 12. A number of typical examples of the castings produced on the Sherman machine are shown in Fig. 13.

[4]U. S. Patent No. 1,922,598, Feb. 6, 1931.

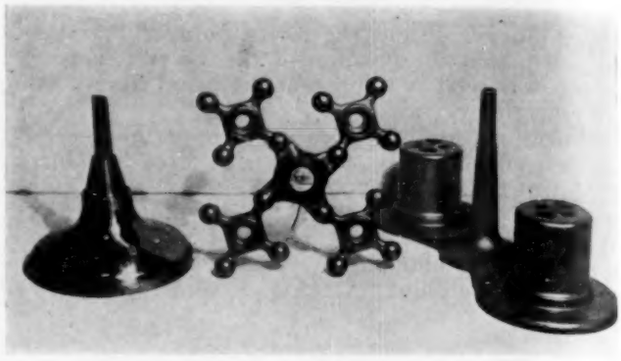


Fig. 13. Castings Produced by the Sherman Machine

Morin Machine

The Morin machine, patented by Louis H. Morin[4] and assigned to the Doehler Die Casting Co. is illustrated in Fig. 14. The writer will not attempt to describe this machine in detail since this information can be obtained by a study of the patent specifications.

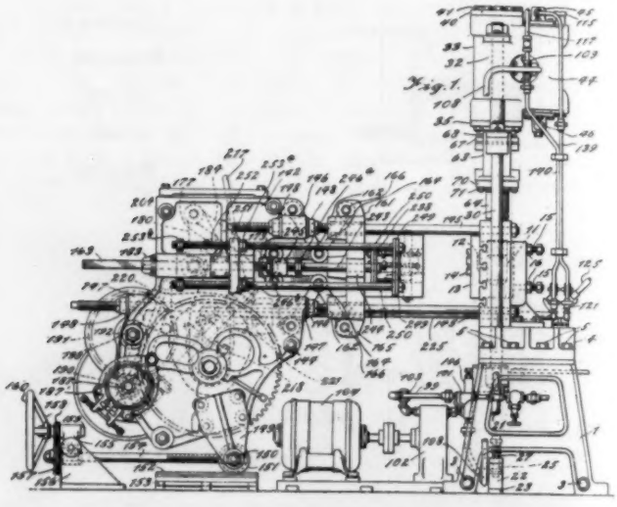


Fig. 14. The Morin Machine

THIS ARTICLE WILL BE CONCLUDED IN AN EARLY ISSUE.—ED.

Protection From Galvanic Corrosion

Q.—The enclosed booklets will give an idea of the method by which submerged coils are inserted in steam boilers, the point we wish to make clear being that the copper coils are permitted to rest upon the steel tubes of the steam boiler.

It seems to be an established fact that an electrolytic action is set up by this contact of the copper tubes with the steel boiler tubes, and there is a prevailing opinion that this electrolytic action is destructive of the boiler tubes rather than the copper coils.

Our new method of installing our coils in a steam boiler provides for a steel "backbone" or beam supporting coils within steam boiler and preventing contact of coils with boiler tubes. We insulate the coil from this steel backbone by means of lead pads. We should like to know whether this is to be considered effective insulation against electrolytic action of this type.

A.—Dissimilar metals like copper and steel in contact under water will cause an accelerated attack of the steel around the point of contact due to electrolytic action. This attack will most generally be confined to a relatively small area with the result that the thickness of the steel tube is reduced until failure occurs.

The insertion of lead between the copper and steel is not a preventive. Bakelite or rubber are much to be preferred for insulation. The latter can be cut from sheet to any convenient shape or size of pad desired. In some cases where the steel tubes are of small enough diameter sections of all rubber tubing can be slipped over the steel tubes at the points in question.

A. K. G.

Approved Codes in the Metal Industries

THE metal industries as everyone knows, cover such a wide variety of specialized trades and manufacturing operations that it has been necessary to have a number of codes to cover the industry adequately. We have published in the past issues extended abstracts of some of the more important codes as follows:

Copper and Brass Mill Products, December 1933.
Fabricated Metal Products and Metal Coating and Finishing Industries, December 1933.
Non-Ferrous Foundry Industry, February 1934.
Smelting and Refining (Ingot Manufacture), February 1934.
Silverware Manufacturing, March 1934.
Secondary Aluminum, March 1934.

Lack of space makes it impossible to give full details of all the codes in the many divisions of the metal manufacturing and finishing industries. For the sake of compactness and brevity, therefore, we have arranged the following table, which gives the salient details of other codes which have been approved in our industries to date.

All of these codes include certain exceptions to the minimum wages and maximum hours. They all include many of the same trade practices, such as the prohibition of misbranding, misleading advertising, commercial bribery, excessive discounts, selling below cost, rebates, etc. For that reason these points are not listed below since they are common to all. Specific points, however, of interest to individual trades are noted.

Industry	Date Approved	Max. Hrs.	Min. Wages	Points of Interest in Trade Practice, Etc.
Paint, Varnish & Lacquer Mfrs.	Oct. 31, 1933	40	40-30c	Regulation of dating & discounts. Prohibit guarantee against price decline. Prohibit time guarantees for product. Regulation of consignments. Regulation of "Free Deals". A schedule of manufacturing restrictions.
Buffing & Polishing Wheel Industry	Nov. 4, 1933	40	40-26c	Prohibit guarantee against price decline. Regulation of datings and discounts, terms, etc. Open price regulations.
Buffing & Polishing Composition Industry	Nov. 4, 1933	40	40-26c	Same as for Buffing and Polishing Wheel Industry.
Precious Jewelry Products Industry	Nov. 27, 1933	40	40c	Standards of quality of precious metal alloys. Regulation of consignments, samples, terms, datings. Prohibit of design piracy.
Valve & Fitting Mfg. Industry	Dec. 15, 1933	40	40-30c	Open price regulations. Regulation of credits, terms and discounts. Regulation of guarantees and special services.
Electrotype & Stereotype Industry	Dec. 23, 1933	40	$1.00—journeymen .90—branchmen .40—unskilled	Standard basis of estimating and pricing. Regulation of credits and terms. Prohibit free service or products.
Watch Case Mfg. Industry	Dec. 23, 1933	40	35c	Establish cost system. Prohibit imitation of designs, trade marks, etc. Prohibit guarantee against price rise or decline. Set standards of quality in materials used.
Coated Abrasive Industry	Dec. 30, 1933	40	40-35c	
Railway Brass Car & Locomotive Journal Bearings & Casting Mfg. Industry	Jan. 29, 1934	40	40-32c	
Die Casting Mfg. Industry	Mar. 8, 1934	40	40-32½c	Regulation of discounts, charges under changed specifications, charges for die mfr. & maintenance, and minimum deliveries under contracts. Dies remain in possession of die casting manufacturer. Prohibit guarantee against price rise and decline.

Complete copies of any of these codes can be obtained from the Superintendent of Documents, Washington, D. C., for 5 cents each.

Non-Ferrous Foundry Ingot Shapes

By PIERCE BARKER
Metallurgical Engineer, Detroit, Mich.

A Complete Description of the Characteristics Demanded of Ingots for Foundry Use. Practical Reasons for the Various Shapes Used. Visual Inspection Important.—Part 5, Conclusion*

THE drawings shown in this article represent only a very few of the large number of shapes in commercial use. The author knows of over 150 in actual use.

The shapes as indicated are generally peculiar to the alloy or metal noted. However, aside from the trade requirements, there is no special reason why other alloys cannot be cast in similar shape, so long as the user is not confused by the practice.

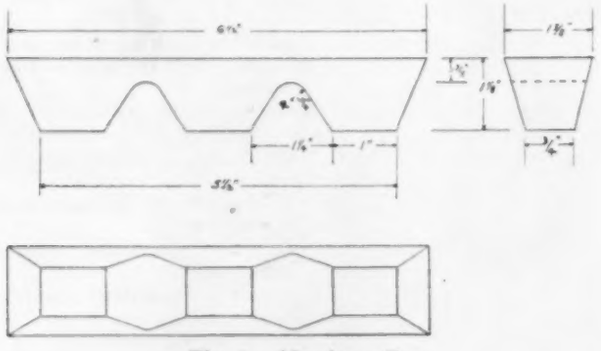


Fig. 1. Aluminum Bar

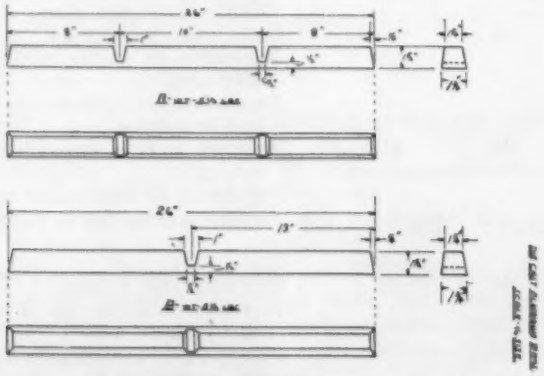


Fig. 2. Die Casting Aluminum Bars

Many types of shapes are in use and the dimensions are as important as the shapes. There are many variations and combinations of shapes and any ingot manufacturer may combine various characteristics, resulting in an original shape which will serve to advertise his particular product. Each special shape should be kept for a particular alloy, to distinguish it for use in the non-ferrous foundry.

The aluminum bar, 10 ozs., Fig. 1. may be used for 98:99 aluminum, steel mill aluminum, (94-98) or for silicon aluminum alloys like 95:5.

Aluminum base or zinc base die-cast alloys are cast in molds shapes shown, Figs. 2 and 3, and also in bars similar to those shown in Figs. 1 and 4.

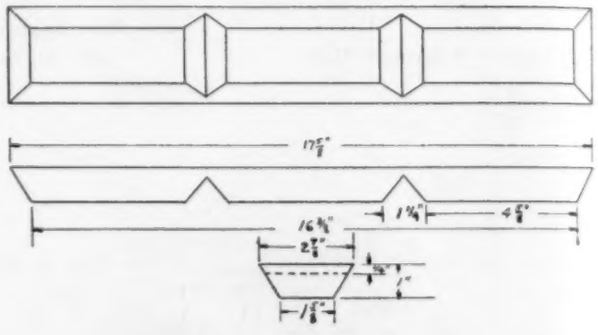


Fig. 3. Die Casting Slab-Ingot

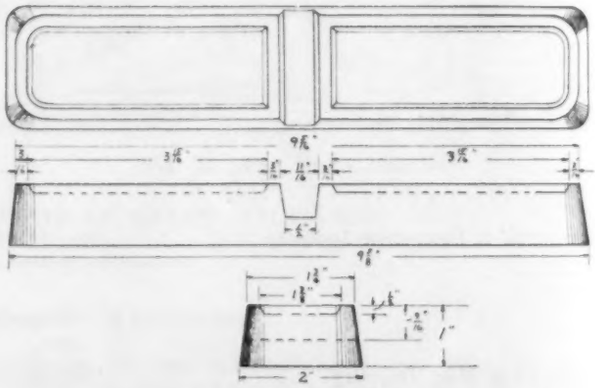


Fig. 4. Type Metal Bar

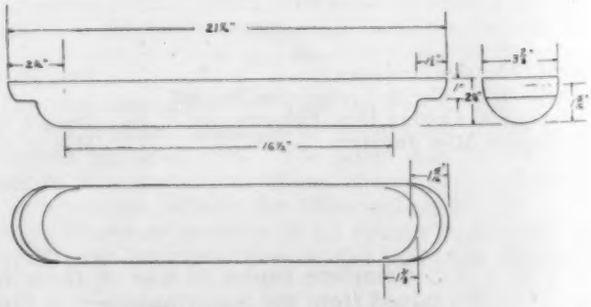


Fig. 5. Lead or Babbitt Pig

*Parts 1 to 4 were published in our issues for May, June and September, 1933, and March, 1934.

Babbitts, especially lead base, may be cast into pigs as shown in Fig. 5, for large scale operations. Generally it

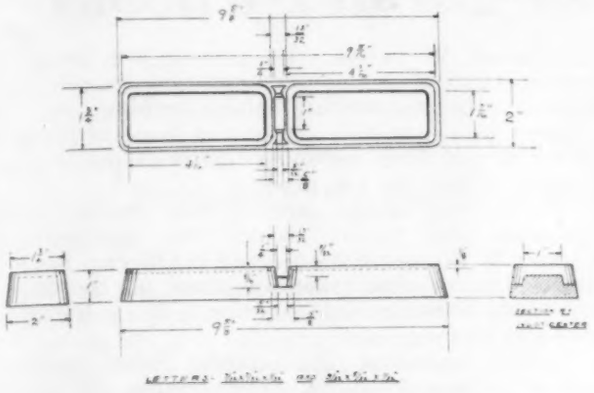


Fig. 6. Babbitt or Solder Bars

is preferred in small bars, 2 to 8 pounds weight each, as shown in Fig. 6.

Brasses and bronzes are all cast in similar shapes. The

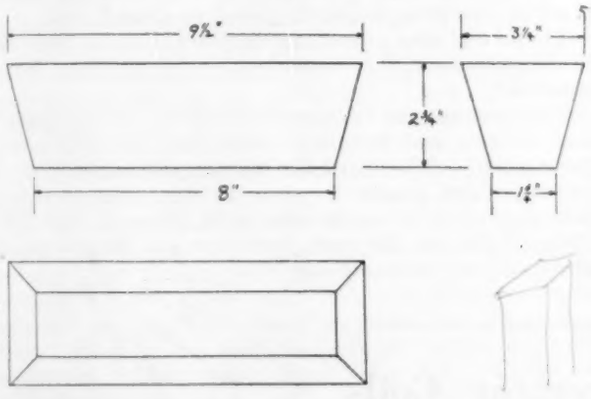


Fig. 7. Brass Ingot

one shown in Fig. 7 is not restricted only to the alloy indicated. However, each ingot manufacturer keeps a particular shape for each alloy. Manganese and aluminum bronzes are cast into shapes similar to that shown on page 65 (an 18 pound ingot), in addition to a wide variety of others. Usually these brasses and bronzes

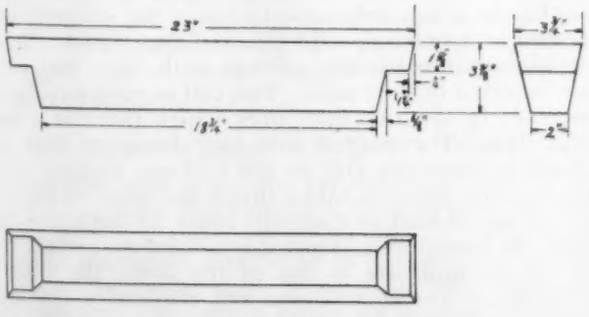


Fig. 8. White Metal Pig

make a much better looking ingot in the smaller sizes (and this is true of many alloys) and they are more convenient for making weights and handling generally.

For large scale operations, the white metal pig shown in Fig. 8 is of a convenient size and weight.

Notched bars similar to that shown in Fig. 9 are used for tin and lead-base babbitts, type metals and special white metal alloys, as they are of a convenient size and the face is readily marked with a designating figure.

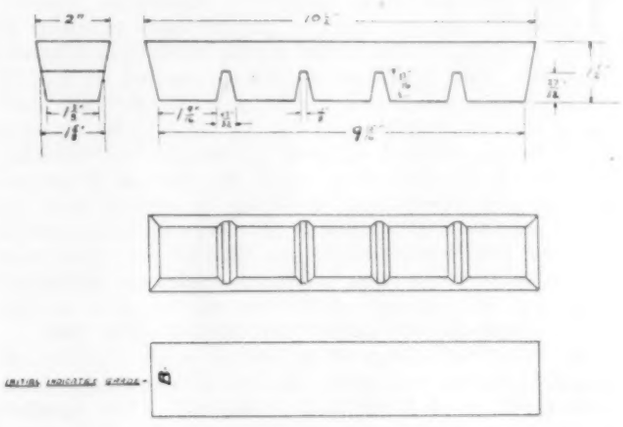


Fig. 9. Babbitt Bar

The two-notch type ingot shown in Fig. 10 finds favor for many alloys of aluminum with silicon, copper,

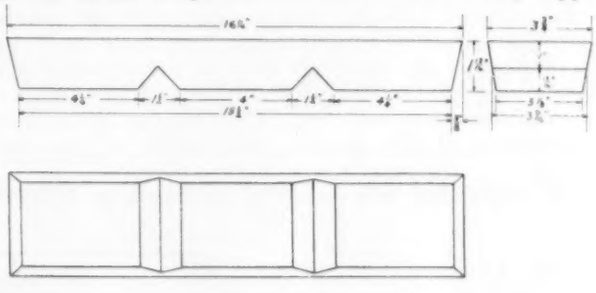


Fig. 10. Two-Notch Ingot for Aluminum, Babbitt or Lead

nickel, etc., and as indicated, it is also a convenient size for babbitts, lead and other white metals.

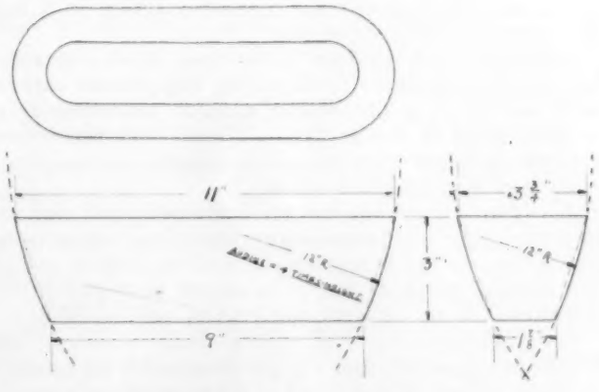


Fig. 11. Radial Ingot for Bronze or Brass

Radial ingot shapes (Fig. 11), are a type designated to foster easy removal from the molds. They are generally satisfactory, but where the molds are badly pitted, or the alloy is a very corroding one (like high phosphor bronzes), nothing can prevent sticking in the molds.

Newark Branch Meeting

THE Newark Branch of the American Electroplaters' Society held its annual open meeting on April 7, 1934, at the Elks' Club, 1048 Broad Street, Newark. The educational session started at 3 P.M.

The first paper was a description of chromium plating in the automotive industry, by Charles H. Proctor. Mr. Proctor outlined the general practice in this industry and also described in detail the method of chromium plating sheet zinc, showing a sample hub cap which was typical of this work. He explained that it was not yet commercially feasible to use sheet zinc hub caps as brass was so much easier to plate and there was not enough difference in the price at this time to make up the added care needed with zinc.

An excellent description of a wide variety of lacquer finishes was given by Dr. Klinkenstein, technical director of Maas and Waldstein. The speaker showed a number of samples of lacquered switch plates which imitated an extraordinary variety of special finishes and color combinations heretofore obtained only in metal finishes. Some of the samples also showed imitation cloisonné, imitation porcelain, and even imitation cloth.

Mr. George Gehling read a paper on barrel plating giving a report of typical work done in a day's run. He explained the methods used in present day practice, giving the processes involved and the compositions of the solutions used. Mr. Gehling stressed the importance of the proper preparation of the base metals.

An interesting talk on metal etching was delivered by Samuel R. Taylor. He summarized briefly the various kinds of etching in commercial practice to-day such as transfer etching, photo etching, etc. He showed very attractive samples of some of the work which he had done, including reproductions of photographs, silhouettes and profiles.

The balance of the meeting was devoted to the Question Box Session, which was conducted by Charles H. Proctor in the absence of Oliver J. Sizelove. One of the questions asked was about the composition of the old Klondike Gold solution. This solution was given as follows:

Sodium carbonate, 2½ pounds; Sal-ammoniac, 8 ounces; Water, 3 gallons. Temperature, 180 degrees F. Anodes, Oreide metal (copper 90, zinc 10), and also some steel anodes.

The important part of operation of this solution is the correct manipulation. Sometimes the solution has to be worked for a period before the deposits appear. When the solution turns green, one ounce of potassium or sodium cyanide is added to clear it up.

There was also considerable discussion on the value of single vs. double nickel salts in still and barrel solutions.

The session was very well attended. The papers of real interest and technical value, and the discussions were warm. Afterward the meeting adjourned for the members and guests to go to dinner, after which an informal entertainment was held, also at the Elks' Club. Like all Newark functions, it was a worth while and entertaining day.

Coating Refrigerator Coils

Q.—WE are making a refrigeration coil using seamless steel tubing and steel fins. The return bends on the tube are acetylene welded. Would you recommend a tin mixture that we could guarantee as good a protective coating against corrosive action in a large commercial refrigerator box?

Hitherto such all-steel coils have been galvanized by our competitors. Galvanizing has proven satisfactory as far as a protection against corrosive action is concerned in a wet box. Would you recommend any tin mixture that we could guarantee equal to a zinc coat in protective quality?

A.—Electrotinning, we are informed, will not protect the coils from corrosion. It will be better to hot galvanize. If tin is wanted, it will be best to use the hot tinning method, but it is stated that galvanizing is better. Many makers use copper coils.—Ed.

A.—Refrigerating coils made from seamless steel tubing are generally hot dip galvanized for a protective coating rather than tinned. A tin mixture used for milk cans is 474 lbs. of tin to 526 lbs. of lead. This mixture cannot be guaranteed against corrosive action although since it is used for milk cans it should render satisfactory service for these coils.

I do not believe there is a tin mixture that is as good as galvanizing by the hot dip method. There may be such a mixture but the writer does not know of one.

If there is a hot dip galvanizing plant in the near vicinity it is recommended that these coils be galvanized. We are very familiar with these coils and most of them are coated for protection by hot dip galvanizing. It is a very dangerous job to galvanize these coils and they should not be done by those unfamiliar with such work. The coils must first be pickled thoroughly in a hot sulphuric pickle, then washed, then dipped in a muriatic acid dip, and then dried. While drying the threads are painted with lime and plugs are inserted in the tubes. The coil is very slowly immersed in the zinc bath over which there is a very thin flux. The plug is left very loose so that any steam or moisture still in the coil can escape. Particular care must be taken that some bend in the coil is not full of acid as that will cause an explosion and burn the operators. When it is absolutely certain that all of the moisture is out of the coils, the plug is screwed up in the coil end and the entire coil held under the bath with special equipment to submerse it. When the coil is fully coated it is slowly raised out of the bath and at the same time dusted with fine white sal-ammoniac to run off the excess metal and clean up the coating. The coil is so held that the excess metal will drain to specific points where it is scraped off as it collects before it hardens. The coils are then allowed to cool.—**W. G. Imhoff.**

Electro-Plating Costs and Estimating

Methods of Estimating the Cost of Electro Plating the Wide Variety of Miscellaneous Work Done by Job Shops. These Methods Were Developed by the Masters' Electro-Plating Association of New York

ONE of the most important factors in the success of a job plating shop is the **accurate knowledge of costs.** It so happens, however, that this factor is conspicuous by its absence in most shops.

There are several reasons for the average job shop owner's laxity in keeping cost figures. In the first place he is almost always a "practical plater", a man who has risen from the wheel or the tank; by temperament and experience a man of work, not of figures; a producer, not an accountant. In the second place, the operations in the job plating plant are really numerous, complex and varied. Unless the shop sticks to one class of work, every job is different in detail, if not in principle from every other job. Even many of the large manufacturing plants have found it difficult to keep accurate costs in their plating departments.

But important as costs are, they are no more important than another basic function in the job plating shop, namely, estimating. Now here is the anomaly. Every plater is sure that he can estimate accurately. Yet, if a sample is given to any ten platers, their estimates, independently made, will vary over a range of 100 per cent. If the piece really costs 15 cents to plate, these ten estimates will vary from 10 cents to twenty cents. Why? Because the platers are not really estimating. They only think they are. **They are really guessing.**

Now none of the platers would admit this fact. They are all experienced platers. They have "estimated" for years. Why do their estimates vary so widely? **Because they do not really know their costs.** Consequently they have no foundation for their estimates.

It was in order to improve this condition that the Masters' Electro-Plating Association, Inc., of New York, (a part of the Master Electro Platers' Institute of the United States) appointed a committee to study the problem of costs and estimating, to develop a method which should be simple and practical, but at the same time accurate enough to allow the plater to estimate safely.

Estimates Based on Polisher's Time

In order to have a basis for figuring costs, it was decided to take the polisher's time as the common denominator; in other words, to load all costs on the polisher and figure everything in terms of the "polishing hour" or the hour of "wheel time"—cutting down and coloring—and get a figure for costs in terms of so much per hour of wheel time.

In order to get a start, a supposed shop with four polishers was taken up and estimates given by the various members of the Cost Committee, of what its costs should be. The average of these estimates was taken and the costs set down as shown in the table following. The figures are based on New York conditions. Polishers wages average about 75c. per hour; minimum wages, 40 cents per hour; working time, 40 hours per week or about 175 hours per month.

OPERATING COSTS FOR A SUPPOSED JOB PLATING SHOP EMPLOYING FOUR MEN ON THE WHEEL

Estimated output $2100
Estimated plant investment ... $7000

	Cost in Dollars Per month
Labor:	
Polishers	$525
4 men x 40 hours per week 4-1/3 weeks per month—about 700 hours per month 700 hours x 75c per hour average —total polishing labor—$525	
Platers	200
2 men (plater & helper) x 40 hours per week x 4-1/3 weeks per month— about 350 hours per month 350 hours x 57½c per hour average—about $200	
Executive	215
$50 per week x 4-1/3 weeks —about $215 per month	
Office Help	65
Girl @ $15 per week x 4-1/3 weeks—about $65 per month	
Materials	250
12% of estimated output ($2100) about $250	
Rent	75
Power	75
Gas, Water & Coal	40
Insurance:	50
Fire Compensation Miscellaneous	
Repairs & Depreciation	90
Depreciation	
10% of $7000 (investment in plant) $700 per year—about $60 a month	
Repairs	
5% of $7000 $350 per year—about $30 per month	
Trucking & Shipping	100
Bad Debts & Discounts	90
About 4-5% of estimated output ($2100)—about $90	
Telephone, Stationery, Stamps, etc.	25
Miscellaneous & Emergencies	100
Total Cost of Operation	$1900

COSTS PER HOUR OF WHEEL TIME	$2.71
$\frac{1900}{700} = 2.71$	
If a Sales Price is obtained (per hour of wheel time) of	$3.00
Profit per hour of wheel time	.29
Profit per month	$200.00
29c per hour x 700=$203.00 or about $200.00.	
Total income to owner per month	$415.00
Salary $215.00	
Profit 200.00	
$415.00	

Checking Results by Actual Operations

Then several members of the Association were asked to give their own operating figures, in total dollars. These shops were of different sizes, but representative, in order to obtain a true cross section of the trade. The Table below gives these figures:

MONTHLY OPERATING COSTS OF A VARIETY OF PLATING SHOPS

	Shop 1 4 polishers 700 hours	Shop 2 5 polishers 875 hours	Shop 3 12 polishers 2100 hours	Shop 4 10 polishers 1750 hours	Shop 5 10 polishers 1750 hours
Investment	8,000	9,000	20,000	20,000	20,000
Capacity	2,800	3,000	10,000	8,000	8,000
Labor:					
Polishers	525	875	1,560	1,310	1,360
Platers, Helpers, Lacquerers, Dippers, Wirers (Male & Female) & Inspectors	225	350	1,615	1,325	610
Executives & Sales	650	435	435	650	700
Office	65	85	85	85	110
Materials	100	275	1,000	1,000	400
Rent	125	135	225	250	200
Power	100	100	250	300	250
Gas, Water, Coal	15	50	50	100	125
Insurance	25	50	150	125	150
Repair & Dep.	100	115	250	430	315
Truck & Ship.	100	75	355	265	210
Bad Debts & Discounts	75	90	300	320	195
Phone, Stationery, etc.	45	30	50	50	50
Misc. & Emergency	100	40	200	250	200
Total Cost	$2,250	$2,705	$6,525	$6,460	$4,875
Cost per hr. of Wheel Time (Total $ divided by total polishing hours.)	$3.21	$3.09	$3.11	$3.69	$2.79

Note that all of these results group themselves fairly closely around $3.00 per hour of wheel time, except for Shop No. 1 and Shop No. 4. These shops turned out to be special cases.

Shop No. 1 is small, but it has three partners; hence the Executives' salaries item is very high. However, due to the fact that there are three interested parties in the shop, their output capacity is higher than that of the average shop with four polishers; also their cost of materials, gas, water and coal are low. Shop No. 4 does a great deal of fancy finishing work, coloring, oxidizing, dipping, etc. much of which requires a small proportion of wheel work and a large amount of plating room work. Hence the plating room costs are high in proportion to polishing. A method of figuring will be shown later which takes this condition into consideration.

Caution Necessary

It must be borne in mind that the above income will be obtained only by **averaging 100 per cent operation.** To keep this up throughout the year cannot be expected because of slack periods. Consequently the shop in busy seasons must run overtime to make up for dull periods.

A word of caution is necessary. The shop owner may have lucky periods. There will be times when his bad debt losses will be low; for some weeks or months no repairs may be necessary. Also depreciation is not felt regularly, every month, but at irregular periods, when a machine breaks down or gives out due to old age. The sums set aside for these items may consequently accumulate in the bank and it may seem to the owner that he is making much more than his normal profit. But he must beware. This accumulation of cash is **not** profit. **It is only a reserve for future contingencies.** The time is sure to come when he will need money for a new tank, or a new lathe, or perhaps to meet a large loss through a bad account, or for any one of a hundred reasons. The **money must be reserved** for such purposes. To distribute it as profits is to remove a part of the foundation of the business.

It will be interesting to see how these figures group themselves when turned into percentages. Below is a tabulation which includes all the shops discussed above, but giving the costs in terms of **cents per dollars spent.**

COST OF OPERATION OF VARIOUS PLATING SHOPS IN CENTS PER DOLLAR OF EXPENDITURE

	Supposed Shop %	No. 1 %	No. 2 %	No. 3 %	No. 4 %	No. 5 %
Labor:						
Polishers	27.5	23.0	32.5	23.8	20.1	28.0
Platers, Helpers, Lacquerers, Dippers, Wirers, Inspectors, etc.	9.2	10.0	13.0	24.7	20.7	12.5
Executives & Sales	11.8	29.0	16.0	6.7	10.0	14.2
Office	3.4	3.0	3.0	1.3	1.3	2.3
Materials	13.1	4.5	10.0	15.3	15.6	8.1
Rent	5.3	5.5	5.0	3.5	3.8	4.1
Power	3.9	4.5	3.8	3.8	4.7	5.1
Gas, Water, Coal	2.1	0.7	1.9	0.8	1.5	2.7
Insurance	2.6	1.1	1.9	2.3	1.9	3.1
Repairs & Depreciation	4.7	4.5	4.2	3.8	6.7	6.5
Trucking and Shipping	5.2	4.5	2.8	5.4	4.2	4.3
Bad Debts & Discounts	4.7	3.3	3.3	4.7	4.9	4.0
Telephone, Stationery, etc.	1.3	2.0	1.1	0.8	0.8	1.0
Misc. & Emerg.	5.2	4.4	1.5	3.1	3.8	4.1
Total	100	100	100	100	100	100

Deductions From Data

It is clear from the above that there is considerable variation from shop to shop. This was expected, of course. It is also noticeable, however, that there are a number of points of similarity. These points are:

1. Shops which do a "normal" amount of polishing in connection with their plated work, have a cost which runs about $3.00 per hour of wheel time.

2. The cost of polishers wages is about 25 cents of every dollar spent.

3. The cost of all direct labor is about 40 cents of every dollar spent.

4. The cost of indirect labor and overhead is about 60 cents of every dollar spent.

Estimates Based on Total Direct Labor

We have now to consider the type of work in which there is very little or no polishing and a great deal of plating. Here we cannot base our estimates on the polishing time, because the polishing time is very short and the plating room operations are long; consequently the figure of $3.00 per hour would be too low. To raise it by guessing at the proportion of plating work would be inaccurate.

The Conclusions (3 and 4) listed above give us a clue to a safe method of figuring. Note that Direct Labor takes about 40 cents of every dollar spent and Indirect Labor and Overhead (in other words, all other costs) take about 60 cents. Hence the Indirect Labor and Overhead is equal to one and one-half times the Direct Labor, and the total cost is the sum of these two—or two and one half times the Direct Labor.

Suppose we consider, for example, a possible job to illustrate the case. Below is a list of operations, time and costs, on a small sized automobile radiator shell. The same wage rates are used as in the previous tables in order to make a fair comparison.

COST OF DIRECT LABOR IN CHROMIUM PLATING A SMALL SIZED RADIATOR SHELL

Operation	Operator	Time	Wage rate	Cost
1. Polishing (Cutting down)	Polisher	30 minutes	75c per hour	.37½
2. Rack, hang in Cleaner, take out, hang in 1st Nickel Solution.	Plater	5 minutes	75c per hour	.06¼
3. Take out of Nickel Solution, rinse in cold water, hang in Acid Copper Solution.	Plater	3 minutes	75c per hour	.03¾
4. Take out of Acid Copper solution, rinse in cold water & dry in sawdust.	Plater's Helper Or Boy	5 minutes	40c per hour	.03⅓
5. Color buff Copper.	Polisher	10 minutes	75c per hour	.12½
6. Rack, hang in Cleaner, take out & hang in Nickel Solution.	Plater	5 minutes	75c per hour	.06¼
7. Take out of Nickel, rinse in cold & hot water & dry in sawdust.	Plater's Helper Or Boy	5 minutes	40c per hour	.03⅓
8. Color buff Nickel.	Polisher	5 minutes	75c per hour	.06¼
9. Rack, hang in Chromium solution, take out, wash & dry in sawdust.	Plater	10 minutes	75c per hour	.12½
10. Color buff Chromium.	Polisher	5 minutes	75c per hour	.06¼
			Total Cost of Direct Labor ..	.97-11/12
			or about	98 cents

Total Cost = 2½ x .98 = $2.45

Now let us see how this figure compares with the result by the "Wheel Hour" method. Taking the wheel time from the above table we have the following:

Operator 1.	Polishing (cutting down)	30 minutes
Operator 5.	Color buff copper	10 minutes
Operator 8.	Color buff nickel	5 minutes
Operator 10.	Color buff chromium	5 minutes
		50 minutes

At $3.00 per hour of wheel time, the cost estimate would be:

$$\frac{50}{60} \times \$3.00 = \$2.50$$

which checks very closely the preceding estimate of $2.45.

Conclusions

It is clear that certain conclusions can be safely drawn.

1. On work that calls for an average amount of polishing and buffing (cutting down and coloring) it is unsafe to estimate less than $3.00 per hour of total wheel time. This is a quick, simple, method, but not always accurate.

2. A more accurate method is to estimate the total direct labor cost, operation by operation through the plating and polishing rooms. Multiply this cost by two and one-half, for a safe estimate of the cost.

3. The 2½ to 1 factor can be used for all still plated decorative work in base metals, but not for barrel plating, "hard chromium", gold or silver plating. Barrel plating calls for very little labor, being largely mechanical in character. "Hard chromium" work spends so much time in the tank and uses so much power, that it is in a different class from decorative plating. Gold and silver work estimates must include special allowances for the cost of the metals because of their high price.

Attack of Brine on Solder

Q.—WE understand from a customer who manufactures a large number of ice cream coolers that there are a few cases where the solder in the lock seams of copper brine tanks have been partially dissolved by calcium brine. The solder is 40% tin and 60% lead, using very pure metals for the mixture.

Have other people had similar experiences? And does calcium chloride sometimes contain impurities which injure solder? Is there a remedy?

A.—The writer knows of no service data on copper brine tanks soldered with lead-tin. It would be natural to expect corrosion, however, resulting from electrolytic action between the solder and copper. Riveting would be a better way of fabricating and would eliminate the possibility of corrosion.

If the copper sheet were tinned, the lead tin solder would be less attacked, but the resistance of tin to brine is variable.

Red brass, (85% copper) and brazing would probably be more resistant, if riveting cannot be used.

A. K. Graham.

Casting Silver Cylinders

Q.—IN the March 1933 issue of **Metal Industry** we read with considerable interest the article entitled "Fluxes in Brass Melting." It gave us an idea as to what might be the fundamental cause of some trouble we are having with the casting of fine silver cylinders, and we are asking you for any suggestions that you might offer.

Our trouble is in gas holes in most of the castings. Occasionally we get one or two without any defects, but not often. After reading this article we suspected that the defect was largely with the flux. We give you the outline of our schedule.

The casting weighs about thirty ounces avoirdupois, cast in regular iron foundry sand, just barely moist enough to hang together. They are approximately 3½" long 1½" in diameter, with a ¾" sand core hole, the core sand being rather coarse and open with a hole through it for ventilation. The molds are of the open top type, and are vertical in the long dimension of the castings, so there is no apparent reason why gases should not escape freely. The silver is generally a remelt from previous castings, adding approximately one ounce of new stock for losses occurring in machining. There may be a very slight trace of copper and gold as a result of gold soldering conditions. We have been using a clean fused borax as a flux, somewhat sparingly, the metal being melted in the standard Colorado Clay Crucibles, natural gas as fuel, and a very small pit type of furnace.

We have not had means of measuring temperature, but we have experimented with temperature slightly above the melted condition, to what we know to be quite high. We are quite aware that silver is highly absorbent of oxygen or gasses when in the melted state, but the fact that we have had instances of perfectly sound castings, other conditions being equal, indicates something locally wrong.

A.—The melting and casting of silver are not the easiest of the metal worker's jobs. Remelting scrap silver is less satisfactory than the first melt, and with each remelt the results are less satisfactory. You tell us that sometimes your method gives perfectly sound castings, sometimes not. Please note whether or not the sound ones come from new metal; also whether the very poor results are connected with old metal or not. This may answer your question.

Borax is an excellent flux; we suggest that you use it freely, however, rather than sparingly. Some people use a mixture of borax and boric acid crystals. Other fluxes are borax with charcoal; or borax with sugar. Do not use any material containing chloride, such as salt or ammonium chloride or mercuric chloride. Sand crucibles or sand-lined graphite crucibles are standard.

Unless you have already done so, we would suggest that you try some kind of deoxidizer. An interesting and helpful article on this subject was prepared by E. A. Capillon and read before the American Institute of Mining & Metallurgical Engineers in Feb. 1930. The paper was entitled Melting and Casting Some Gold Alloys, but it gives considerable information on silver as well. A copy can be obtained by sending 25 cents to the Institute at 29 W. 39th St., N. Y. City.

When writing to the Institute, we would suggest that you also get a copy of Manufacture of Sterling Silver and Some of Its Physical Properties by Leach & Chatfield, dated Feb. 1928. Normally these pamphlets sell for 25 cents. If not available in pamphlet form, the secretary will inform you of other sources.

The deoxidizer we refer to is a 10% phosphor copper; it is sold in the form of small shot, and consists of 10% phosphorous, 90% copper. An extremely small amount of this material is to be added to the melt a few minutes before pouring—not over 1 oz. of the phosphor copper to every 100 pounds of metal melted. The deoxidizer must be added to the melt in such a way as to be entirely submerged; it helps to stir the melt vigorously; it is not enough merely to throw it on top of the charge. The phosphorous combines with the gases in the melt, and they are driven off. A minute amount of copper remains in the melt, but we assume that this would not be objectionable in your case.

Two other interesting papers are the following: Melting Sterling Silver in High Frequency Induction Furnaces by R. H. Leach, Apr. 1928, and Melting Fine Silver in High Frequency Induction Furnace by D. L. Ogden, Apr. 1932. Copies of these can be obtained from the Electrochemical Society, Columbia University, New York City. **Jewelry Metallurgist.**

Grinding Aluminum

SPECIAL abrasive wheels have been perfected for grinding aluminum. The selection of these wheels will be understood best by studying the explanations given in the catalogues and other literature furnished by the makers of the wheels. There is a non-uniformity of the methods of designating wheels by the different makers, so that the user is liable to be confused unless he gets the system for each wheel. The user may find that one maker might apply certain terms for wheel qualities in the reverse order from that of another maker.

The following are examples of wheel markings: For grinding, or snagging, heavy aluminum castings, one wheel maker advises the use of a No. 12 treated 20—P2T Alundum Bakelite wheel. This wheel is to be operated at the highest speed, which is up to 9,500 surface speed in feet per minute. For heavy castings snagged at a lower surface speed, which is up to 6,500 feet per minute, a No. 12 treated 3724—O Crystolon vitrified wheel is recommended. When grinding light castings, a No. 12 treated 30/2—N4T Alundum Bakelite wheel is satisfactory. Furthermore, these markings are for wheels of about 10" to 12" in diameter and up to 2" thick. A glance at these mark-

ings will be enough to convince the beginner that he has a puzzle to solve, and the need of the catalogues becomes apparent. Other wheels are: Emery 24 to 26 grain; Carborundum 20 to 24 grain and P to Q grade and elastic band; Alundum 36 to 46 grain, 3 to 4 elastic band; Crystolon 20 to 24 grain and P to Q grade.

Some of the terms applied to grinding wheels may be defined briefly as follows: The grain or grit means the particles of abrasive material, which may range anywhere from the fineness of flour up to quite coarse particles. The grain size is stated in numbers. Thus a 24 grain is one passing through a screen having 24 meshes in a linear inch with a limit through which it will not pass a stated smaller screen. The grain may consist of emery, or corundum, which is a natural mineral in the form of a crystalline oxide of aluminum; the grain may be alundum, which is known chemically as an oxide of aluminum, which is made in the electric furnace. The grain may be carborundum, which is a product of the electric furnace, and is known chemically as a carbide of silicon, because it is composed of carbon and silicon.

The manufactured abrasives mentioned above may have different qualities that can be made during their processing. Thus the grains may be tough or brittle, and these qualities are known as their temper. By the grade of a wheel is meant the kind and condition of the bond that holds the grain. The grade ranges from a very soft to a very hard, meaning the relative ease of breaking the dulled grain out of the bond. The grade is indicated by capital letters. A hard grade has a vitrified bond, such as a clay, which has been converted into the procelain form after being molded with its grain mixture into a wheel form and fired in a furnace. The soft wheels have such bond as rubber, celluloid, shellac, etc. For strength and the highest speeds, the Bakelite bond is good. This is a manufactured material that is strong, water and oil proof, and will withstand a fairly high temperature. It is also a good electrical insulator.

The surface speed of the wheel affects its action as to hardness and softness, independently of the qualities of the bond. The higher the surface speed, the harder the wheel acts. With all these peculiarities of grinding wheels, and the difficult conditions to meet with aluminum, it will be seen that the problem is not a simple one.—**W. B. Francis.**

Making Gold Fulminate from Gold Filings

Q.—WILL you please publish the process for refining gold filings, in order to obtain 24-k fulminate gold. We plan to use the latter in making up a fine gold plating solution.

A.—It is quite possible to do this, but the process is rather lengthy. The large shop, handling considerable gold filings and using gilding solutions freely, would do very well to refine its gold filings as a matter of routine, and to convert the fine gold into solution whenever desired. However, the small shop would find that the equipment needed for handling a single small lot of filings would cost enough to erase the profit accruing from doing the refining.

Here are the reasons. Refining the filings requires acids, and fumes are developed. The refining must be carefully done, as small amounts of silver or copper, if left in the gold, would have a bad effect upon the color of the gilding. The fine gold secured must then be dissolved again, and the fulminate obtained. This fulminate is explosive when dry.

To describe the method fully, in sufficient detail to enable a beginner to do the work properly, would take considerable space. However, here is a brief resume:

First a magnet is passed through the filings to remove iron and steel. Then they are burned in a frying pan to remove paper, dust, etc. Then they are treated with nitric acid, to remove all the base metal that can be reached. After being washed they are treated with aqua regia, which dissolves the gold and the remaining base metals, (except silver, which is instead converted into a heavy scum of silver chloride.) These treatments produce unpleasant fumes.

The solution, which contains dissolved gold, etc., is filtered, and the gold is precipitated by any one of several substances, possibly ferrous sulphate or oxalic acid; this yields a powder which is fairly pure gold when washed.

The careful worker will dissolve this gold a second time, and precipitate it again, to insure high quality. These latter steps also produce fumes.

The gold is now ready to be converted into fulminate. It is once more dissolved in aqua regia, and the solution is slowly evaporated down to a syrup. Next, water is added (preferably distilled water), and finally, a carefully adjusted amount of ammonia. The ammonia converts the dissolved gold into the brown so-called fulminate.

As stated above, this is explosive when dry. Therefore keep it wet and at once proceed to make it up into your gilding solution.—**Jewelry Metallurgist.**

Malleability of Nickel and Monel Metal

By Owen W. Ellis*

A brief review of the literature is followed by a discussion of the effect of annealing temperature on the hardness of two rods—½ in. and 1 in. in diameter, respectively—of cold-drawn nickel, which were the subject of malleability tests at temperatures varying from 250° to 1100°C. The relationship between energy of blow and percentage reduction in height of normal ½-in. samples is demonstrated, as is the influence of the initial hardness of the same material on its resistance to deformation at 750°C. The paper concludes with a description of experiments: (1) on the effect of annealing normal samples of the 1-in. material on its malleability at 800°, 900°, and 1000°C., and (2) on the malleability of Monel metal.

*Abstract of a paper read at the meeting of the British Institute of Metals in London, England, March 7-8, 1934.

The Electrochemical Society Meeting

Electrochemists Discuss Deposition of Aluminum Corrosion of Zinc, Nickel Deposits and Other Metals at Their Meeting in Asheville, N. C., April 26-28.

The Corrosion of Zinc in Chloride Solutions

By C. W. Borgmann and U. R. Evans

The research described aimed at studying the corrosion of zinc, in the cast and rolled conditions and in various degrees of purity, under conditions of partial immersion in potassium chloride solutions, sea water and distilled water. The results provide little hope of materially increasing the resistance of zinc to any of the liquids studied by eliminating or adding other metals, by protecting the cut edges or by avoiding abrasion of a rolled surface.

Electrodeposition of Aluminum from Non-Aqueous Solutions

By R. D. Blue and F. C. Mathers

Aluminum of high purity can be deposited easily in a bright, finely crystalline, adherent form from a solution made by dissolving metallic aluminum in ethyl bromide and benzene (C_6H_6) using aluminum bromide as a starter or catalyst. Toluene, xylene, β-tetrahydro-naphthalene, and kerosene may be substituted for benzene under certain conditions and ethyl chloride, methyl chloride, and ethylene dichloride for ethyl bromide. The aluminum adheres well to platinum, copper, steel and cast iron but not to magnesium or aluminum.

The Mechanism of Electrodeposition

By L. B. Hunt

The detailed mechanism of electrodeposition is discussed from the point of view of the supply of metal ions and their distribution at the cathode-electrolyte interface, the supply of electrons from the cathode, and the factors determining the electron transitions and subsequent lattice development.

The Electrodeposition of Indium From Cyanide Solutions

By Daniel Gray

Aqueous solutions of indium cyanide dissolved in an excess of cyanide are not very stable. There is a marked tendency for $In(OH)_3$ to separate out. This precipitation may, however, be avoided and the bath rendered very stable by adding a very weak acid, such as glucose or glycine (½ g. glucose per g. In content of bath). Soft silver-white deposits of In are obtained from this bath of 30 to 60 g./L. In, at current densities of 1 to 16 amp./dm.^{2}, and room temperature.

Ductility and Adhesion of Nickel Deposits

By F. P. Romanoff

The ductility of electrodeposited nickel is a function of the crystal structure and of the contained basic salts and gases. Hard fibrous or columnar nickel structures have an apparent hardening effect on a ductile base even when very thin. This apparent hardening of the base disappears upon removing the deposit. Full ductile conical nickel structures of any thickness will not effect the base adversely. Ductile nickel can be hardened by absorption of hydrogen through action as a cathode in alkaline or acid solutions. Chromium deposition on nickel has the same effect. Part of this hardening can be overcome through vacuum or heat treatment, or by chromium plating under conditions which prevent the absorption of too much hydrogen. Testing for adhesion by the Erichsen extruded cup test, or modifications thereof, is shown to be unreliable. A modified cap test is given which will always detect poor adhesion.

The Electrodeposition of Copper, Nickel and Zinc Alloys from Cyanide Solutions

By Charles L. Faust and G. H. Montillon

The experimental results indicate that alloys of copper, nickel, and zinc may be deposited from cyanide solutions. All of the deposits were bright, uniform, smooth, and adherent. The color of the deposits varied from golden copper to platinum white. Deposition favored zinc and copper over nickel. The following data were obtained to determine those conditions of temperature, bath composition, and current density which would give deposits having the color characteristic of "nickel-silver" alloys.

Alloys of Magnesium Research

Part 1.—The Constitution of the Magnesium-Rich Alloys of Magnesium and Nickel

By John L. Haughton and Ronald J. M. Payne*

The constitution of magnesium alloys containing up to 50 per cent. nickel has been studied by thermal and microscopic methods. Magnesium forms a eutectic with the compound Mg_2Ni at a temperature of 507° C. and a composition of 23·5 per cent. nickel. The solubility of nickel in solid magnesium is less than 0.1 per cent.

*Abstract of a paper read at the meeting of the British Institute of Metals in London, England, March 7-8, 1934.

Metal Fabrication and Finishing

Aluminum Inter-Factory Lunch Wagon Cuts Time Losses

LIGHT aluminum alloys, fabricated into a small, rubber-tired lunch wagon, are aiding a number of manufacturing plants to minimize lost time, especially where lunch hours have been set aside by six-hour shifts. The illustration shows the "portable restaurant" which was devised by Goodyear-Zeppelin Corporation, Akron, Ohio.

This compact wagon weighs 425 pounds and is 8½ feet long, about four feet high above the wheels, and 33 inches wide. One man propels it about the plant. In production for only a short time, Goodyear-Zeppelin reports several large factories have adopted the lunch wagon already.

The equipment was designed after exhaustive consultation with representative factory lunch room and cafeteria managers. The upper section of the wagon has 27 compartments, mostly 16 inches deep and ranging from four by nine to 17 by 24 inches in the other dimensions. Also in the upper part are a 5½-gallon coffee urn and a 4½-gallon insulated container. Food in all the upper compartments can be protected at once by the hinged aluminum cover, shown folded up in the photo. The lower part holds a large enclosed pie rack, and the top-opening milk and iced food compartments, the latter being interconnected with suitable drains. Space is provided for towels and other equipment.

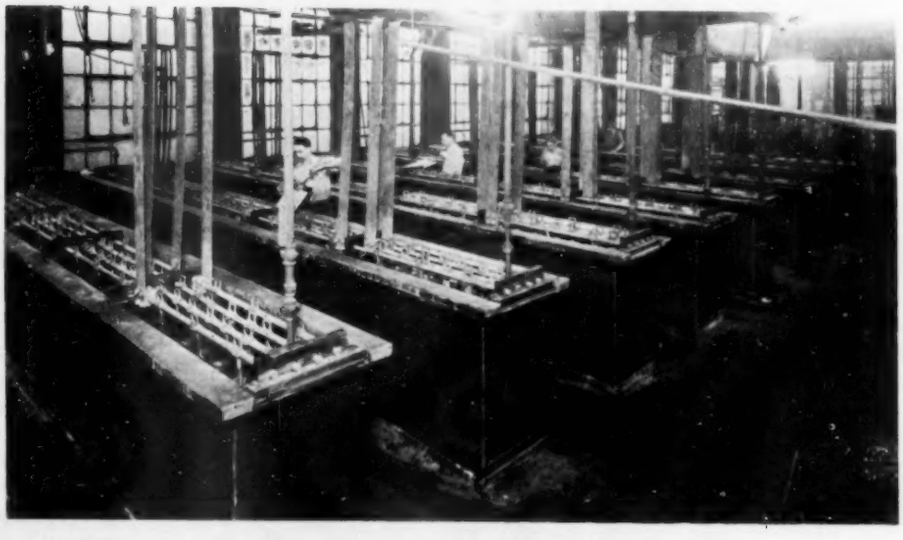
Rubber-Lined Tanks Speed Up Electrotyping Process

COPPER electrotypes for some of the most extensive advertisers are processed in the eight steel tanks at the plant of The Rapid Electrotype Company, Cincinnati, Ohio, shown in the photo here. The tanks are 24 feet long, 38 inches deep, 24 inches wide. They are lined with 3/16 inch Triflex rubber, and the bottom of each is covered with ⅛ inch thickness of rubber as protection against corrosion. The sides are protected by an application of Acidseal paint.

About a year ago The Rapid Electrotype Company permitted a trial installation of two small Vulcalock-lined plating tanks. These served so satisfactorily that when replacement of a battery of eight old 24-foot wooden tubs became necessary, the same type of rubber-lined steel tanks were specified. As a result floor space has been gained and countless leaks have been eliminated. Working conditions are improved.

Furthermore, with the same electrical consumption, 145 electrotypes are being processed per day per tank in the new equipment as compared with 105 in the old wood tanks of the same size. This was made possible by the elimination of electrical leakage which "grounded" the old equipment. Considerable loss of current had prevailed during the last four or five years the acid-soaked wood tubs were used. This was brought to light the first week Vulcalock tanks were placed in service. Work handled in the old tubs required two hours to process, whereas the same plating operation is carried out now in 1½ hours.

Triflex, Vulcalock and Acidseal are products of the B. F. Goodrich Rubber Company, Akron, Ohio.



Battery of Rubber-Lined Tanks at Plant of The Rapid Electrotyping Company, Cincinnati

EDITORIALS

The State of Trade

IN OUR last issue we published a list of the earnings of some of the most important companies in our industry, twelve in number. In every case the figures for 1933 compared with 1932 showed an increase in profits, a decrease in losses or a profit where there had been a loss. What is happening in 1934? The following reports are of a general nature but the metal industries follow the general trend so closely that they can be accepted as indicative.

The American Iron and Steel Institute reports that the steel industry is operating at 55.7% capacity for the week beginning April 30th, compared with 54 one week ago and 43.3 one month ago. According to the National Industrial Conference Board, the production of durable and non-durable goods increased more than seasonally in March and the first half of April. Notable gains were reported in the automobile industry, building and engineering construction, steel and iron, bituminous coal mining, electric power production and textile apparel manufacturing. It is noteworthy that construction awards rose not only in the publicly financed type but in the private class as well. The General Electric Company and the Westinghouse Company report much higher bookings and billings in the first quarter of 1934 than for the corresponding period of 1933. The New York Times Weekly Index stood at 87 for April 21st as against 84.6 for the previous week and 69 of the same period of 1933.

Col. Leonard P. Ayres, the nationally known economist, states that business operations were at 66% of normal last November and had risen to 76% in March; also that the gains are continuing in April. He expressed himself as encouraged by the considerable number of labor disputes which have been settled, but warned that the most difficult and important problem continues to be that of getting back to work the great numbers of men and women who are still unemployed (about 8,000,000 against a peak of 13,000,000).

On the whole the signs are cheerful.

The question has been raised from time to time as to whether our improvement, was "natural" or brought about by the efforts of the Government through its "experimental" institutions such as the N.R.A., A.A.A., etc. Obviously this is a difficult question to answer. We can try to evaluate these efforts by comparing our condition with those of other industrial nations, but the comparisons are not certain. The chart of Canadian business published by the Financial Post stands at about 87 in comparison with 1926 at 100, having risen from about 69, the low point in March 1933; a gain of 18 points. Referring again to the Times Business Index, we now stand at about 87 in comparison with 60 our low point, also in March 1933; a gain of 27 points. Great Britain, according to The Economist, rose from about 95 the low point in the latter part of 1931 to about 103 in the latter part of 1933, using 1924 as 100; a gain of 8 points. According to a chart published by Standards Statistic Company, the Canadian recovery since July 1932 has lagged considerably behind that of the United States, but from March 1933 to date both countries show a similar percentage of gain.

Obviously there is little that can be gained from too minute an analysis of these figures. The only conclusions that can safely be drawn are:

1. Business in the United States is definitely improving.
2. Business in Great Britain and Canada is also improving at the same or perhaps a slightly lower rate.

Who is responsible for the improvement? We prefer to leave that argument to the politicians. We can only say that business must improve much more before it is really good.

A Balanced Budget

DURING the last two weeks headlines appeared in the daily press announcing the fact that the British Treasury had not only balanced its budget for the past year but actually had a surplus of about $150,000,000. Naturally we asked "How did they do it? If they can do it, why can't we?"

Both questions are comparatively easy to answer. The British taxpayer has endured the burden of income taxes at the basic rate of 25 per cent. Government employees have taken pay cuts of 10 per cent, and the unemployed have had their insurance payments reduced 10 per cent. Moreover, income was considerably increased by one or two unexpected windfalls, such as unusual returns from inheritance taxes and the increased revenue from the new tariff.

It may be interesting to take stock of our own situation to date. Below are the approximate figures of our Government's receipts and expenditures.

	Estimated for 12 months ending June 30, 1934.	Actual for 9 months ending March 31, 1934.	Proportional Estimate for 12 months ending June, 30, 1934.
Expenditures	10,570,000,000	4,850,000,000	6,465,000,000
Regular	3,045,000,000	1,990,000,000	2,650,000,000
Emergency	7,525,000,000	2,860,000,000	3,815,000,000
Income	3,260,000,000	2,300,000,000	3,075,000,000
Deficit	7,310,000,000	2,550,000,000	3,390,000,000

As nearly as can be judged at this time, our deficit

for the year ending June 30, 1934, will be between three and four billions of dollars. This is accounted for in its entirety by the emergency expenditures.

The program is simple if we want to put in into effect. In order to balance our budget we must either eliminate the emergency expenditures or raise our taxes sufficiently to cover them.

Capital Goods Improving

A RAY of sunshine comes from one of the darkest parts of our industrial sky—the capital goods industries. We have a statement before us from the Warner and Swasey Company of Cleveland, one of the largest manufacturers of machine tools, that during the past quarter the company sold turret lathes to thirty different industries, of which 25 may be classified in the durable goods. Not only has the demand for turret lathes increased substantially but there has also been a sharp turn in orders for parts and tools.

According to the National Industrial Conference Board an accumulated demand for new investment capital totalling $4,500,000,000 has piled up in the last three years as a result of the virtual cessation of private financing. It is noteworthy that during the same time Federal financing has called for the same amount from the capital market. The claim may be made that the Government borrowing has removed this money, taking it away from business. The answer can be given with equal justice that business could not have used it under existing conditions and that it was a good thing for the Government to have taken it. Be that as it may, there is without doubt, a pent-up demand for machinery and equipment. The banks have refused loans for such purposes. If the plan of the Federal Government to loan money generally to the durable goods industries is actually put into effect, there will undoubtedly be a marked and immediate improvement in the entire machine tool and equipment field.

Silver Again

FOR a small industry, silver can make more noise than any other in our midst. It is again in the limelight with a demand for more help. Because it is so vociferous and because it is being heard in political circles, it is in order to try to view the situation as a whole.

The United States produces about 30 per cent of the silver mined in the world. The total value in its most prosperous year was $33,000,000. A part of this production is absorbed by the industrial arts including the manufacture of silverware and jewelry, electroplating, etc., but 70 per cent of the world's supply of new metal goes into two great markets, India and China. Because these two nations have inadequate banking facilities, they use silver coin as their medium of exchange and their savings are hoarded metal rather than bank balances.

It is the argument by silver proponents that:

1. Silver must get higher prices in order to rehabilitate the American silver industry.

2. A higher price in the United States would stimulate a higher price throughout the world and thus increase the power of China and India to buy American goods.

3. The large use of silver in our own monetary system would raise commodity prices and increase purchasing power in this country.

The answers to these arguments are the following:

1. Silver is a very small industry and plays a negligible part in our industrial system.

2. So far, the American net price of 64½ cents an ounce has not succeeded in raising the world price of silver above 40 odd cents. Moreover, China and India do not spend their silver in this country. They send their goods to this country and take silver back in exchange. A higher price for silver will mean that they will get less silver than before, consequently have less money for their products, and suffer severe deflation.

3. The power of silver to lift the level of commodity prices is very doubtful to say the least.

There is a strong suspicion throughout the land that the plea for silver is based on the desire to improve the financial condition of a few localities.

What is a Good Finish?

ELECTROPLATING is subject to one of the greatest disadvantages possible in manufactured products. It is difficult to distinguish a first class plate by any except rather involved testing methods.

What are the marks of a good finish? Of course there is adherence, freedom from porosity, and uniformity. These three factors are visible to the eye. But there is still another factor, fully as important as any of the others—sufficient thickness. The difference between a good and a cheap job, therefore becomes evident only after the article has been in service for a time.

We know now from rather bitter experience that the thickness of deposit is probably the most important single factor in the quality of a plate, and its life in service. We know now that automobiles on which the bumpers have rusted after a few weeks have been skimped. How could it be otherwise? If the price for chromium plating an item was 25 cents per piece two years ago and is now 10 cents or even less, (no uncommon occurrence) what chance is there that the 10-cent job will include acid copper, a heavy coating of nickel and a sufficient length of time in the chromium tank?

The same principle applies to tin and zinc whether hot dipped or electroplated. To the uninitiated purchaser a half ounce coating of zinc looks exactly the same as a 2-ounce coating. But what is their comparative life?

It may pay to specify a low priced job if the work does not warrant anything more, but it never pays to demand a good job for the price of a cheap one. It cannot be done.

Correspondence and Discussion

Pumps for Filtering Plating Solutions

To the Editor of **Metal Industry:**

We read with interest your January issue which carries Weisberg & Greenwald's article on "Filtration of Plating Solutions."

Regardless of any individual notions on the proper pump or proper press to use, we believe this article is very much worth while. The statements we can whole-heartedly endorse for all platers who want to do quality work are:

> "The chief consideration is to produce clarification of the plating solution at the lowest cost and with the least investment"

and

> "investment in filtration equipment can be recommended as one of the essentials of a well ordered and economically run plating plant."

If the plater acts on this advice and buys filtering equipment and uses it, can we blame him for not finding out about every kind of filter and pump on the market? If he were a chemical engineer he would know a lot about filter presses and pumps. If he were a metallurgical engineer he would know a lot about materials available for filters and pumps. Since he is rarely either, it is logical for him to take the advice of a manufacturer of filtering equipment.

If such a manufacturer also builds a special kind of pump, that pump will most frequently be recommended. If the manufacturer buys pumps to sell with his presses, he will use pumps that are competitive in price and fairly satisfactory. In any case, the object of the plater to clarify his plating solutions is accomplished, and perhaps he is not so interested in the fact that another type of equipment would have cost him only 20c. per day, whereas his present equipment costs 25c. per day.

Weisberg & Greenwald give useful information on selection of the filter press. Their recommendations on pumps are not entirely clear to us. We manufacture both centrifugal and displacement type pumps, and know something of their comparative value in filtering operations as we have many hundreds of pumps on filtering operations in this metropolitan district.

In considering any pump connected to a filter press we assume that the pump is direct connected to a constant speed motor as shown in all the illustrations accompanying the article. The statement is made that "Centrifugal pumps are not so good because the efficiency drops off as the pressure rises . . . . Accordingly, as the pressure increases centrifugal pumps require more and more power to maintain the same rate of flow." This latter statement must refer to rotary or positive displacement pumps which, running at constant speed, deliver a constant capacity and require more power as the back pressure increases. A centrifugal pump running at constant speed delivers less capacity as the pressure rises and requires less and less power with the increase in pressure. (See performance curve at top of accompanying Duriron Bulletin No. 170.)

It is true that a centrifugal pump is usually less efficient than a positive displacement pump, but since—speaking from wide experience—the centrifugal pump will handle a larger volume and do the filtering in a shorter time, the total power used may be less than that required for the positive displacement pump. If we set up a specification for the continuous filtering of the plating solution at an average rate of 900 gallons per hour, it is probable that the first cost of the filter and pump PLUS the power cost, maintenance, and amortization of the complete unit, would be considerably lower by using a good centrifugal pump.

Under "Capacity of Equipment" the article says: "The starting rate may be as high as 50 gallons per square foot of filter area per hour. This drops to perhaps 25 or 30 gallons per square foot per hour as a cake is formed and continues to drop further as the thickness of the cake increases." It is impossible to correlate this statement with the use of a positive displacement type pump, as indicated earlier, since at constant speed the positive displacement type pump delivers a constant capacity regardless of the back pressure. This characteristic is the cause of broken filters, pumps, and valves, also burned-out motors, as the safety valve may have stuck and the motor may not have been protected against overload. The authors must have had centrifugal pumps in mind in making this statement as it corresponds exactly to centrifugal pump performance.

It is our opinion that about 90% of the plating solution filtering units in operation use centrifugal pumps. We know of many very large operations where centrifugal pumps are being used and where positive displacement pumps would be entirely out of the question due to size and cost. We are not so familiar with the very small filtering units, usually of the portable type, as it has only been in recent months that a Duriron pump has been made in small enough size to enter this field.

In the larger filter press problems encountered in the chemical industry and in the manufacture of colors and pigments, we know from experience that the centrifugal pump is now about the only pump considered by the larger and up-to-date manufacturers. Hundreds of Duriron pumps have been bought for filter press work handling corrosive and abrasive slurries and probably over 99% are of the centrifugal type. From this experience we have been able to learn that for the average filtering job a centrifugal pump will do the job in about half the time and at half the pressure of a reciprocating (positive displacement) pump. We can readily make arrangements for any interested parties to check up this performance in a number of large plants where centrifugal pumps have almost entirely displaced the reciprocating or positive displacement type of pump.

The Duriron Company, Inc.,
New York, March 7, 1934. W. E. Pratt.

With further reference to our letter of March 7th, you may be interested to know that the new "Chemical Engineers' Handbook" by John H. Perry, just off the press, devotes forty-seven pages to the subject of "Filtration." This book is supposed to be "the last word" on chemical engineering equipment and processes, and it is interesting to note the following statement on centrifugal pumps:

> "Centrifugal pumps are ideal for feeding pressure filters under most conditions. They give low initial pressures which increase steadily as the cake builds up."

The Duriron Company, Inc.,
New York, March 16, 1934. W. E. Pratt.

To the Editor of **Metal Industry:**

In preparing our article we tried to avoid anything that might be construed as bias for or against any particular manufacturer's equipment. Since it was impossible to list all the manufacturers of good equipment—especially pumps—the omission of a reference to any manufacturer or his equipment is not to be taken as a sign that we do not think well of it.

With respect to centrifugal pumps, it should be understood that our comments were made with the requirements of the average plating shop in mind. We were aware that centrifugal pumps are frequently employed in filtration work, for we have specified them for such purposes ourselves. Certain characteristics of centrifugal pumps are excellent for filtration work. The difficulty has been, at least until very recently, to obtain a centrifugal pump that will operate economically under the conditions that prevail in the average plating shop.

Exception is taken to some of our statements which are considered to reflect unfavorably on centrifugal pumps. In the first place, we tried to bring out the fact, which is admitted that with increasing pressure, the capacity of the centrifugal pump drops off rather rapidly. To maintain a certain mini-

mum rate of filtration towards the end of the cycle, when the pressure has risen, requires the use of a centrifugal pump that has considerably larger capacity at low pressures.

It is argued that it is not necessary to use high pressures for filtration. We agree that it is desirable to work at the lowest pressures practicable. Nevertheless, we consider the pressures shown on the performance curve to which reference is made unduly low. Since the pressure is determined by the nature of the cake and the number of square feet of filtration surface available, the use of low pressures may involve using a larger filter to give the same capacity. Most platers prefer a long operating cycle, which is another reason for using higher pressures.

The curve referred to shows that the efficiency rises to a maximum when the head reaches about 20 feet (10 lbs. pressure), and then drops off rather rapidly. Since we were referring to higher pressures, we consider that this performance curve supports our statement.

Exception is also taken to certain statements we have made about the effect of cake thickness and rate of flow. These statements are not inconsistent if it is understood that in referring to positive displacement pumps, we recommended suitable provision for bypassing excess solution, and for building up pressure gradually.

We are still looking for a centrifugal pump suitable for plating work. The latest one that we are trying out is an all nickel pump operating at 3,500 revolutions per minute. The purpose of the higher speed is to get higher operating pressure without too much sacrifice of capacity, and without requiring too much power. The results so far are very favorable.

Willard F. Greenwald and Louis Weisberg.

New York, March 22, 1934.

Technical Papers

Copper-Nickel Alloy with Silicon for Slide Valves (Siliziumhaltige Kupfer-Nickel Legierung fur Dampfschieber) "Die Warme," Vol. 56, Apr. 8, 1933, page 214.

Abstract from "Metals and Alloys," February, 1934: A 50 Ni, 34 Cu, 16 Sn alloy previously employed showed favorable properties at elevated temperatures, but involved some manufacturing difficulties. While Fe, Mn, Sb, Zn and Bi exerted but insignificant effects, marked results were secured with Si. The following alloys yielded the best results: 50 Ni, 39 Cu, 8 Sn, 3 Si and 65 Ni, 27.5 Cu, 4 Sn, 3.5 Si. The Brinell hardness of 350 at 20° C. dropped to only 320 at 450° C. Replacing Sn by Si in ordinary 84/16 CuSn alloys results in a gain of strength at elevated temperatures as shown by the following data:

	20°C	350°C	450°C
84/16 CuSn alloy	134	52	13.5
90.75/6.3/2.95 CuSnSi alloy	150	96	42.

Technical Properties of Beryllium Containing Cu-Ni Alloys (Technische Eigenschaften der be-haltigen Cu-Ni-Legierungen) G. Masing & W. Pocher. "Wissenschaftliche Veroffentlichungen aus dem Siemens-Konzern," Vol. 11, July 8, 1932, pages 93-98.

Abstract from "Metals and Alloys," February, 1934: Cu-Ni alloys with additions of Be can be hardened to a considerably higher degree, above 300 Brinell, with much less Be than is possible in the binary Cu alloys. The alloy of 39% Cu, 60% Ni, 1% Be showed in the refined state a tensile strength of 115 kg./mm.2; 19% Cu, 80% Ni, 1% Be showed 100 kg./mm.2 with an elongation as high as 13%. These values were retained up to 400° or 450° C., while binary alloys lose their tensile strength at a much lower temperature. A list of a great number of Cu-Ni alloys with different amounts of Be is given with their hardness and tensile properties at different heat treatments.

Tentative Metal Specifications

American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pa., has issued the following **Tentative Specifications** for metals and **Tentative Test Methods.** They are available at 25 cents each from the Society, which solicits criticism of them by all interested persons or firms:

B 45-33 T. Determination of Phosphorous in Copper-Base Alloys in Ingot Form for Sand Castings.

E 18-33 T. Rockwell Hardness Testing of Metallic Materials.

B 58-33 T. Aluminum-Base Sand-Casting Alloys in Ingot Form.

B 26-33 T. Aluminum-Base Alloy Sand Castings.

B 89-33 T. Aluminum-Alloy (Duralumin) Bars, Rods and Shapes (Aluminum-Copper-Magnesium-Manganese).

B 25-33 T. Aluminum Sheet and Plate.

B 78-33 T. Duralumin Sheet and Plate.

B 79-33 T. Aluminum-Managanese Alloy Sheet and Plate.

B 40-33 T. Chemical Analysis of Aluminum and Light Aluminum Alloys.

B 92-33 T. Magnesium Ingot and Stick for Remelting.

A 153-33 T. Zinc Coating (Hot-Dip) on Hardware and Fastenings.

Rates of Loss of Weight and Pitting of Ferrous and Non-Ferrous Specimens and Metallic Protective Coatings. By K. H. Logan and R. H. Taylor, Bureau of Standards. Soil-Corrosion Studies, 1932. Supt. Doc., 5 cents.

Abstract: Reports on this have been issued at intervals of approximately 2 years since 1922. The first report described the soils and materials under investigation, and the 1930 reports summarized all data then available. This report deals only with data on specimens removed in 1932. Consideration of these data does not materially alter the conclusions reached earlier that the character of the soil controls the rates of corrosion of ferrous materials and that in the same soil all of the commonly used ferrous materials corrode at nearly the same rate.

Metallic protective coatings show signs of failure, after 8 years in several of the more corrosive soils. Several non-ferrous metals and alloys are more resistant to soil action than the ferrous materials commonly used. Copper, and alloys high in copper, corrode less rapidly than most ferrous materials in the soils investigated.

A zinc coating weighing 1 ounce per square foot of exposed surface should extend the life of the coated material at least 6 years in very corrosive soils, and much longer under more favorable conditions.

Thermal Expansion of Bearing Bronzes. Technical News Bulletin No. 203. Bureau of Standards, Washington, D. C. Free.

Data were obtained at various temperatures between room temperature and 200C (392F). The work is fully described in RP665 in the March number of the Journal of Research. The results obtained on heating and cooling are shown in two figures, and the coefficients of expansion for various temperature ranges are given in a table.

Abrasives in Metal Polishes. By Cyril S. Kimball. "Chemical Industries," Vol. 34, No. 3, March, 1934; pp. 209-214. Covers types of polishes in use; progress of change in them; special polishes; abrasives used as polishes; sales; consumption.

Aluminum Drums for Chemicals. By H. V. Churchill. "Chemical Industries," Vol. 34, No. 3, March, 1934; pp. 215-216. Describes new type containers for highly concentrated nitric and other acids.

Government Publications

Gate Valves. Proposed Federal Specification TS-1989. Federal Specifications Board, Room 735, Federal Warehouse, Washington, D. C. Free. Comment requested.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

Analyses

Q.—We are sending you samples of our nickel and copper solutions. We are having trouble with the nickel peeling. We originally had an acid copper solution, but are now using cyanide. We are using round copper anodes. The nickel anodes are flat. We have a vanadium steel tank for the chromium with lead slabs for anodes. We are in doubt about the pH test on the nickel solution.—B.—McK.

A.—Analysis of nickel solution:

Metallic nickel	2.40 oz.
Chlorides	.43 oz.
pH	5.2

This solution is in very poor condition. We would suggest that you add to each gallon of solution in the tank 2 oz. single nickel salts, 2 oz. sodium chloride (common table salt), and 5 cubic centimeters of 26° ammonia.

Analysis of cyanide copper solution:

Metallic copper	1.60 oz.
Free cyanide	0.33 oz.

This solution is also in a very poor condition. We would suggest that you add to each gallon of solution in the tank 2 oz. copper cyanide and 2½ oz. sodium cyanide if the solution is operated at 110°F. If operated at room temperature, add ½ oz. more of sodium cyanide to each gallon of solution.

O. J. S., Problem 5,289.

Copper Finish

Q.—We are enclosing a sample of a hardware part which is being sold by the trade in a copper oxidized finish at the same price as barrel brass plated and lacquered. Can you tell us what the finish is on this sample and how it is put on?

A.—The sample finish as submitted can be produced by the following method:

After the work is thoroughly cleaned and steel ball burnished, it is copper plated by the immersion process, which consists of placing the work for a few seconds in a solution of copper sulfate 2 oz., sulfuric acid 1 oz., water 1 gallon. After the work is covered with copper, it is rinsed in clean cold water, then in hot water and dried.

The next operation consists of applying a bronze lacquer. This lacquer is a combination of a pigment and a dye, and can be supplied by lacquer makers advertising in **Metal Industry.**

O. J. S., Problem 5,290.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Gold Finishes

Q.—How can we produce a gold color on brass floor lamps without using gold plate? We would like some kind of dip if possible.

Also, please give us formula for a gold dip solution, using gold as cyanide instead of fulminate, which is not obtainable here in San Francisco.

A.—The only way to produce a uniform imitation gold color on the brass work without gold plating is to mix a gold dye with lacquer used to coat the work.

Formula for dip gold solution:

Gold cyanide	4 pennyweight
Sodium cyanide	4 oz.
Sodium carbonate	6 oz.
Water	1 gallon

The gold solution should be used in a glazed earthernware crock. The crock is placed in a tank and surrounded with water heated to 180° to 190°F.

O. J. S., Problem 5,291.

Old English Brass

Q.—We have been unable to get a satisfactory Old English finish. We are forwarding several pieces of brass and brass plating. We are a small organization and cannot afford to spend much money for doing this finish and we hope that you will have a simple method of securing results.

A.—The method is as follows:

Two solutions are used. No. 1 solution is made by adding one fluid ounce of liquid sulfur to one gallon of water. No. 2 solution is made by dissolving 2 ounces of copper sulfate in 1 gallon of water.

The procedure consists of cleaning the work thoroughly and then dipping in No. 1 solution; then, without rinsing, dip it into No. 2 solution. It is then rinsed in clean cold water and the dipping operations repeated until the color is dark enough. The work is then dried and scratchbrushed lightly, using a fine crimped brass wire wheel to even the finish. Finally, lacquer to preserve the finish.

O. J. S., Problem 5,292.

Plating Nickel Silver

Q.—We buy german silver in sheets, ⅛" thick, and cut it into pieces 1" by 4". How would you polish these pieces to get proper high color for nickel plating?

After polishing, how is it cleaned and prepared for nickel plating?

Is regular nickel solution O. K.?

What is the treatment after nickel and before chromium plating?

What is the composition of nickel silver?

A.—We presume that the work is to be hand polished, and if so, we would suggest the following procedure:

The work should be cut down in strip 16 inches or 20 inches long by laying them on a board, using a stitched buff and tripoli. After the operation, cut to size, and then color, using a loose leaf buff with a lime composition.

The work should then be racked and cleaned in an alkaline electric cleaner, rinsed in water, then in cyanide dip, rinsed again in water, and then nickel plated in the regular nickel solution.

After nickel plating, the nickel deposit is colored and then chromium plated. It will not be necessary to color the chromium deposit if the nickel coloring operation is done properly.

Nickel silver is an alloy of copper, nickel and zinc. This alloy can be chromium plated without nickel plating.

O. J. S., Problem 5,293.

Silver Analysis

Q.—We are sending a sample of a silver solution that has been giving quite a bit of trouble with peeling and plating unevenly. We have been plating brass tubing and castings and headlight reflectors. I do not know what the original formula was. I have some silver chloride on hand that I would prefer to use in rebuilding the solution if you think that it is necessary.

A.—Analysis of silver solution:

Metallic silver	0.30 oz.
Free cyanide	3.13 oz.

The metal content is very low and should be replenished by adding three ounces of silver chloride and four ounces of sodium chloride to each gallon of solution.

After nickel plating we would recommend the use of a silver strike solution, before silver plating, to obtain better adherence of the silver deposit.

Nickel silver may be plated with nickel or in the mercury blue dip used before plating in the silver strike and silver solution. Zinc die-cast work should be nickel plated in a die-cast nickel solution and then in the silver strike solution before silver plating.

Britannia metal is most successfully plated by using a special silver strike before the regular strike.

We are sending you under separate cover a copy of the "Platers' Guidebook" which contains the formulae for the different solutions.

O. J. S., Problem 5,294.

Stainless Steel Finishing

Q.—Can you give the formula for a bright dip for stainless steel? Also, a nickel solution for use on stainless steel.

A.—We know of no bright dip for stainless steel.

The regular nickel solution can be used to nickel plate stainless steel. The surface of the work must be etched enough so that the deposit will adhere. A 25% solution of muriatic acid is used with the reverse current of 4 to 6 volts, to etch it.

A dip nickel solution can also be used. This is made by dissolving 1 lb. nickel chloride in ½ gallon water; when the nickel chloride is dissolved, add ½ gallon of hydrochloric acid.

O. J. S., Problem 5,295.

Watch Dials

Q.—Have had considerable trouble with white dials like sample herewith. When I silver plate them they are snow white but, when I use lacquer they turn yellow. And when silver plated and not lacquered they will discolor in several days, when in stock. Some of the dials are brass and others sterling and hard enamel; also sterling with raised gold letters.

A.—If the proper grade of lacquer is used and the silver turns yellow, the trouble is with the silver deposit, or the method of drying the work after silver plating.

It is hard to determine the exact cause of the trouble. We would suggest that you make certain that you are using a clear silver lacquer, and you should consult you lacquer manufacturer in regard to this.

After silver plating, the work should be rinsed thoroughly in alternate clean cold and hot water several times to bleach the deposit so that it will be perfectly white before lacquering.

A silver solution made from silver chloride and cyanide will produce a whiter deposit than one made from silver cyanide and cyanide. After you have followed above suggestions, if you still have trouble, send us a sample of the silver solution for analysis and we will advise you further.

O. J. S., Problem 5,296.

Patents

A Review of Current United States Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,939,421. December 12, 1933. **Coating.** Martin Tosterud, Arnold, Pa.

1,939,667. December 19, 1933. **Metallic Coatings and Method of Making Same.** Henry Csanyi, New York, N. Y.

1,939,799. December 19, 1933. **Lead of High Resistance Against the Action of Hot Sulphuric Acid.** Theodor Wallis, Dessau-Ziebigk in Anhalt, and Oskar Falek, Wiederitzsch, near Leipzig, Germany.

1,940,133. December 19, 1933. **Alloy.** Louis W. Kempf, Cleveland, Ohio.

1,940,262. December 19, 1933. **Welding Flux for Nonferrous Alloys.** Arthur R. Lytle, Bayside, N. Y.

1,940,294. December 19, 1933. **Die.** William G. Calkins, Detroit, Mich.

1,940,448. December 19, 1933. **Separating Metals.** Frank R. Corwin and Leon W. Booton, Forest Hills, N. Y.

1,940,619. December 19, 1933. **Processing Magnesium.** Edwin O. Barstow, John A. Gann, and John E. Hoy, Midland, Mich.

1,940,618. December 19, 1933. **Method of Purifying Magnesium.** Edwin O. Barstow and John A. Gann, Midland, Mich.

1,940,629. December 19, 1933. **Piston Alloy.** Ernst Mahle, Stuttgart, Germany, assignor to Elektronmetall G. m. b. H., Cannstatt-Stuttgart, Germany.

1,940,814. December 26, 1933. **Metal Coating Method.** Charles M. Saeger, Jr., Washington, D. C.

1,940,922. December 26, 1933. **Aluminum Silicon Alloy with a Phosphorous Content of 0.001 to 0.1%.** Roland Sterner-Rainer, Heilbronn, Germany.

1,941,039. December 26, 1933. **Magnesium Alloy.** Alexander Luschenowsky, Berlin, Germany.

1,941,040. December 26, 1933. **Process and Device for Cleaning Precious Metals, Especially Silver.** Carl Mann, Munich, Germany.

1,941,231. December 26, 1933. **Alloy of Beryllium and Aluminum.** Joseph Kent Smith, Detroit, Mich.

1,941,256. December 26, 1933. **Uniform Corrosion Anode and Method of Making Same.** George Fellmeth Geiger, Huntington, W. Va.

1,941,257. December 26, 1933. **Method of Making Uniform Corrosion Anodes.** George Fellmeth Geiger, New York, N. Y.

1,941,230. December 26, 1933. **Beryllium-Aluminum Alloy.** Joseph Kent Smith, Detroit, Mich.

1,941,364. December 26, 1933. **Apparatus for Removing the Lead Covering of Electrical Cable.** Ludwig Nunninghoff, Cologne-Holweide, Germany.

1,941,368. December 26, 1933. **Nickel Alloys.** Joseph Kent Smith, Detroit, Mich.

1,941,438. December 26, 1933. **Process for Metallizing with Reflecting Highly Polished Surface Celluloid in Sheets and Any Other Form by Chemical Means.** Karl Kiefer, Dresden, Germany.

1, 938,045. November 29, 1932. **Pulverizing Mill.** Otto da Costa Schmidt, Sharon, Pa.

1,941,506. January 2, 1934. **Process for Recovering Nonferrous Metals From Melts Containing Metal Oxides.** Wilhelm Witter, Halle, Germany.

1,941,534. January 2, 1934. **Process for Forming Alloys.** Jesse Oatman Betterton, Omaha, Nebr.

1,941,535. January 2, 1934. **Process for Forming Alloys.** Jesse Oatman Betterton, Metuchen, N. J.

1,941,608. January 2, 1934. **Rolling Magnesium Alloy.** Robert D. Lowry and Fred L. Reynolds, Midland, Mich.

1,941,750. January 2, 1934. **Method of Thermically Coating Objects of Iron or Steel with Aluminum or Aluminum Alloy.** Erik Harry Eugen Johansson, Stockholm, Sweden.

1,941,914. January 2, 1934. **Electrochemical Process for the Recovery of Metals from Ores and Other Metal Bearing Materials.** Richard Rodrian, New York, N. Y.

1,942,041. January 2, 1934. **Alloy.** Robert T. Wood, Cleveland, Ohio.

1,942,046. January 2, 1934. **Process for Testing Metals by Polarization.** Turner D. Bottome, Indianapolis, Ind.

1,942,121. January 2, 1934. **Process of Annealing and Zinc Coating Ferrous Articles.** William Harold Potter, Warrington, England.

1,942,202. January 2, 1934. **Rotator.** Ralph F. Cohn, Dixon, Ill.

1,942,208. January 2, 1934. **Means for Obtaining Lead in Metallic Condition.** Paul Gamichon, Paris, France.

1,942,356. January 2, 1934. **Electrodeposition of Chromium.** Colin G. Fink, New York, N. Y. and Charles H. Eldridge, Detroit, Mich.

1,942,469. January 9, 1934. **Chromium Plating.** George E. Barber, Detroit, Mich.

1,942,902. January 9, 1934. **Lacquer and Process of Making the Same.** Leo Roon, Great Neck, N. Y.

1,942,923. January 9, 1934. **Method of Treating Copper and Copper Alloys.** Clarence E. Irion, Columbus, Ohio.

1,943,155. January 9, 1934. **Protector for Tinning Connecting Rods and the Like.** William H. Bagley, Detroit, Mich.

1,943,307. January 16, 1934. **Purifying Light Metals.** Harvey Nicholas Gilbert, Niagara Falls, N. Y.

1,943,738. January 16, 1934. **Process and Composition for Hardening Copper.** Charles E. Moyer, Long, Md.

1,944,183. January 23, 1934. **Alloy.** Louis W. Kempf, Lakewood, and Ivan R. Dawson, Cleveland, Ohio.

1,944,457. January 23, 1934. **Metallic Protective Sheathing for Surfaces and Method of Applying Metal Foil.** Harry F. Perkins, Clayton, Mo.

1,944,461. January 23, 1934. **Method of Centrifugal Casting.** Robert D. Pike, Diablo, Calif.

1,944,460. January 23, 1934. **Centrifugal Casting Device.** Robert D. Pike, Piedmont, Calif.

1,944,733. January 23, 1934. **Siphoning Metal.** Victor C. Doerschuk and Erwin G. Schoeffel, Massena, N. Y.

1,944,778. January 23, 1934. **Method of Protecting Lead Against Corrosion.** Henri Benit, Paris, France.

1,944,813. January 23, 1934. **Manufacture of Paints, Enamels, Etc.** Fritz Schmid, Oberhausen, Germany.

1,945,035. January 30, 1934. **Tumbling Barrel.** Lee B. Green, Lakewood, Ohio.

1,945,288. January 30, 1934. **Zinc Base Alloy.** Pascal J. Morell, Waterbury, Conn.

1,945,297. January 30, 1934. **Aluminum Alloy.** Roland Sterner-Rainer, Heilbronn, Germany.

Do Our Readers Want Patent Information?

A QUESTION has arisen as to the advisability of our continuing to publish patent abstracts in every issue of our journal. The number of patents being granted in the metal and metal finishing industries has grown very large in recent years. It is practically impossible to distinguish between the patents which have commercial possibilities and those which are likely to fall by the wayside. Inevitably the publication of all patents in our industries must include a large proportion of "chaff".

For that reason we ask our readers to advise us on the questionnaire below whether or not they wish us to continue to publish abstracts as we have been doing for many years. Please check one of the questions below and return the slip to **Metal Industry,** 116 John Street, New York.

1. We make use of your patent abstract page and would like to have it continued. ( ) 2. We are not interested in your patent abstract page. ( )

(Readers who have answered these questions in previous months should disregard this.)

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Extra Wide Swing Polishing Lathe

The Hammond Machinery Builders, Inc., 1618 Douglas Ave., Kalamazoo, Mich., have developed a new extra wide swing polishing and buffing lathe.

New Hammond Polisher

The distance from the side of the base to the inside of wheel is 30". This was designed to handle unusually large parts without interference with the base. It is built on one of the standard "Rite-Speed" polishing and buffing lathe bases with extended bearing houses carrying the outer bearings close to the polishing wheels.

The spindle of this lathe is 110" long and mounted on four oversize precision ball bearings. Lathe can be fitted with motors up to and including 10 HP Motor is mounted in the base and drive is by means of V-belt from motor to spindle. All the features of the well known Hammond line of "Rite-Speed" polishing and buffing lathes are incorporated in this special machine, including means for changing V-belts without removing spindle from bearing housings or removing ball bearings from the spindle. The complete spindle and bearing housing assembly can be removed from the base of the lathe in a few moments time.

The machine has a combination switch and brake; forward movement of switch and brake lever operates a master switch which breaks contact of magnetic switch having overload and low voltage protection, cutting current off from the motor before brake is applied.

A push button master starting switch is mounted on the front of the lathe for starting, and motor cannot be started until brake is released. Special attention has been given to bearing seals for preventing foreign matter from entering the bearing housing. Proper tension of V-belts is obtained by loosening a bolt and allowing weight of motor to produce proper tension. Tightening the belt locks the motor rigid.

Adnic, White Metal Alloy With Unusual Properties

A description is given by William B. Price, chief chemist and metallurgist of the Scovill Manufacturing Company, in the April issue of Metals and Alloys, of the properties of Adnic, an alloy consisting of 70 copper, 29 nickel and 1 tin. The description covers its corrosion resistance properties, its physical properties at ordinary and elevated temperatures, and its creep characteristics at elevated temperatures.

The physical properties listed for a ½" hard rod of Adnic are as follows:

Modulus of elasticity, 21,300,000 pounds per square inch.

Elastic limit, 85,000 pounds per square inch.

Yield point, 107,000 pounds per square inch.

Tensile strength, 113,200 pounds per square inch.

Elongation, 10% in 2".

Reduction in area, 56½%.

Scleroscope hardness, 31.

Coefficient of thermal expansion, 0.0000163 per degree C.

Electrical resistivity, 256 ohms per arc mil-foot at 20° C.

Melting point, 1205° C.

Density, 0.321 pounds per cubic inch at 20° C.

Corrosion tests in various media under a wide number of testing conditions show that Adnic is only very slightly attacked by moderate concentrations of cold sodium hydroxide, rating favorably in this respect with nickel and high nickel alloys, and is superior to Admiralty metal and copper. It is said to be equal or superior to pure nickel and definitely superior to Admiralty metal in its resistance to dilute mineral and organic acids, caustic soda and sodium chloride solutions.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Stripers, Flow Guns. New types of equipment for spraying stripes, decorations, edging, etc., on various products of metal or other materials. Bul. D3-34 describes and illustrates this and accessory equipment. Paasche Airbrush Company, 1909 Diversey Parkway, Chicago, Ill.

Ammeters. Tong type equipment is now available for readings up to 800 amperes, A.C. or D.C. These meters operate by applying a pair of jaws to bus bar or other conductor, and do not interrupt current flow. Neither current transformers nor shunts are used. Columbia Electric Manufacturing Company, 4519 Hamilton Avenue, Cleveland, Ohio.

Automatic Manometer. New type, said to be suitable for control of liquid flow or level, pump control, etc., with advantage of providing visible reading of performance at all times. The Meriam Company, 1955 West 112th Street, Cleveland, Ohio.

Chromium Plated Sheets. Fluted design has been added to line of preplated sheet metals for fabrication into finished products, by American Nickeloid Company, Peru, Ill. Sheets available in sizes 30 by 84 inches and 36 by 84 inches, or multiples of these. Circular is available describing this material.

Refractory Cement. Q-Chrome for furnace construction or repair, is said by maker to offer advantages of resistance to extreme temperatures, chemical or abrasive action, etc. Has neutral-base, being made of chromite with minimum of silica; is air-setting, stable, and extremely uniform. Quigley Company, Inc., 56 West 45th Street, New York.

Chromium Plated Sheet Metal. Preplated sheets in a variety of designs, patterns and sizes, for fabrication into stamped or other products. Apollo Metal Works, La Salle, Ill.

Refractory Cement. Improved chrome-base material in Adaproducts line, said by maker to stay indefinitely in suspension in drum or mortar box, develop quick air set, and withstand high temperatures; for furnace construction and repair and similar applications. Botfield Refractories Company, Swanson and Clymer Streets, Philadelphia, Pa.

The Rapid Development of Patina on Copper After Installation

A method is described in the April issue of Metals and Alloys, by J. R. Freeman and P. H. Kirby for producing on copper after installation, the jade-green patina, which forms after several years exposure to natural weathering. The process consists essentially of several sprayings of the copper surface with a "conditioned" ammonium sulphate solution with intermediate drying. The patina formed is practically identical in composition with the natural patina, a basic sulphate of copper. It can be applied to copper roofs, for example, in place by a single spraying treatment.

Procedure for Coloring

The following amounts will make about 110 gallons of solution. Proportionate amounts should be used for small quantities. **All measurements must be exact.**

90 pounds ammonium sulphate-technical grade, (Agricultural grade may be used but its use requires filtering of the solution because of the contained dirt).

3 pounds crystallized copper sulphate (blue vitriol). 1 pound 3 ounces concentrated ammonia (specific gravity 0.90). This is equivalent to 21.1 fluid ounces.

100 gallons clear water.

Preparation of Solution

Important: no iron or metal containers except lead should be used for preparing or storing solution. Wooden barrels or tubs are satisfactory.

Dissolve the 90 pounds of ammonium sulphate in the 100 gallons of clear water. Solution should be complete.

Then add the 3 pounds of copper sulphate to the above solution of ammonium sulphate. This is best done by removing a few gallons of the above solution and dissolving in it as much of the copper sulphate as possible, returning this to the original volume. Repeat this procedure until all of the copper sulphate is dissolved.

Then add slowly, with constant stirring, the 1 pound 3 ounces or (21.1 fluid ounces) of concentrated ammonia to the above solution of ammonium sulphate and copper sulphate.

It is especially important that the ammonia be measured exactly. (The ratio of 1 pound 3 ounces of ammonia to 100 gallons of water must be maintained in preparing this and smaller or greater amounts.)

Method of Application

The copper surface must be free from dirt, oil and grease. It can be cleaned by washing with sodium carbonate solution or lye, and follow with clear water. The surface should then be allowed to weather for a few days to develop a brown tarnish. Better adherence is obtained on this type of tarnished surface than on a polished or brightly pickled surface.

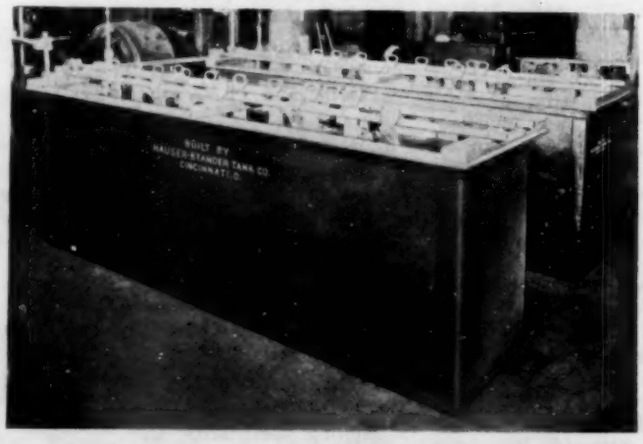
The solution can be applied by spraying with an ordinary garden sprayer, which has been coated inside with bituminous paint.

It has been found that five sprayings will turn out a good job, allowing time between them to permit the solution to dry. This may take from ten or fifteen minutes or more, depending upon weather conditions. The first evidence of the patina is a bluish cast, but on weathering it is replaced by the jade green color desired.

The process is covered by U. S. Patent No. 1,951,304, and Canadian patent No. 334,996, both controlled by Copper and Brass Research Association, New York.

Plating Tanks

The Hauser-Stander Tank Company, Cincinnati, Ohio, manufactures tanks for all purposes, including a line especially designed for electroplating and electrotyping, metal cleaning and finishing. Tanks of wood or steel with rubber or other types of lining are available.



A Pair of Hauser-Stander Rubber-Lined Tanks in an Electrotyping Installation

Hauser-Stander rubber-lined plating tanks, this maker states, have the advantage of permanence, being leak-proof, compact, and neat in appearance. A pair of rubber-lined steel tanks for electrotyping service is shown in the accompanying illustration. Tanks of this type are available from Hauser-Stander in all sizes and shapes, on specification. Rubber linings of any thickness from ⅛ inch up are available.

New Copper Base Alloy

A new high copper alloy containing silicon and zinc has been developed by the Chase Brass and Copper Company, of Waterbury, Conn. This alloy, called Olympic Bronze, is designed especially for structural and engineering services. It is supplied in three types:

A. Cold and hot rolled plates and sheet, strip, rod, wire, tube, forgings and welding rod.

B. Free turning wire and free turning rod.

C. Sand castings and ingots for casting.

Types A and B, it is stated, can be readily cold-worked by all common methods. Type A can be severely cold-worked. For example, rod, drawn to a tensile strength of 100,000 pounds per square inch, can be cold-headed and roll-threaded for making bolts. The heads of such bolts remain tough and able to withstand drastic abuse. Type A is recommended for high strength corrosion resistant forgings.

The best temperature for general forging is between 1500° and 1600° F. This alloy, in the forged condition, has a tensile strength of from 55,000 to 65,000 pounds per square inch.

Type C Olympic Bronze is said to combine excellent physical properties in the cast state with good all-around corrosion resistance, casting qualities and the ability to take fine finishes. The recommended casting temperature is from 1800° to 2000° F.

In the sand cast condition, Type C will have a tensile strength of 40,000 to 50,000 pounds per square inch with elongations of 12 to 16 per cent in 2 inches. Wrought Olympic Bronze ranges in strength from 55,000 to as high as 150,000 pounds per square inch, depending upon the condition.

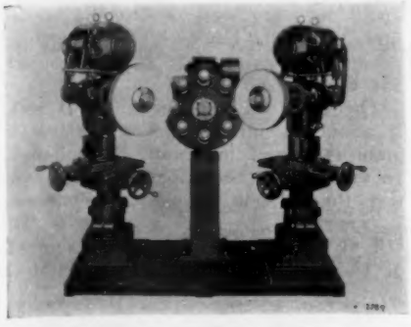
The machining qualities of Olympic Bronze vary with the different types, but can be generally rated as fair.

Some of the recommended uses for this type of material are bolts and screws, angles, bushings, cable, condenser tubes, hardware, propeller shafts, screen cloth, sheathing, structural shapes, welding rods, etc. A catalog issued by the manufacturers describes

the properties of the various types of alloys in full, covering fabrication, tensile properties, miscellaneous mechanical properties, electrical properties, physical and chemical properties, and commercial factors.

Automatic Polishing and Buffing Machine

The Acme type "L-8" Two Wheel Unit is one of several new machines recently built by the Acme Manufacturing Company, Detroit, Mich. It is a complete automatic machine with indexing work holder head and lathes combined, the object being to finish two operations in a single loading; either a



Acme Automatic Polisher

double wheel contact on the same work surface such as cutting down and coloring, or having a side and face contact, completing two single wheel operations, it is stated.

The indexing head has eight spindles which hold the chucks for gripping the particular work to be finished. The two opposite spindles, contacting the buffing wheels revolve while the other three lower spindles are the loading spindles and do not revolve. The head indexes automatically at various speeds up to 1200 indexings per hour, depending upon the contact time required to obtain the required finish.

Chucking arrangements on this machine have been designed for holding work being polished or buffed, in a manner that will automatically eject the work at the point half way between the right hand revolving spindle and the next lower spindle during the indexing, as well as automatically gripping the work just before it contacts the left hand buffing wheel, thereby eliminating the operation and leaving three spindles open to load for the operator. Work up to 4½" in diameter can be handled on the machine.

The machine is used for polishing and buffing small stampings, die castings, etc., such as escutcheons, knobs, caps, bezel rings and many other small parts. Brass stampings are being finished completely at the rate of 1,000 per hour, cutting down and coloring, on this machine, according to the manufacturer.

Nickel Plating Solution for Zinc and Die-Cast

Tuttle Chemical Company, 245 Seventh Avenue, New York, offers a special nickel plating solution for plating on zinc and zinc-base die-cast metal. The solution is sold under the name Zialite, and is said to have peculiar advantages over ordinary nickel plating solutions for zinc. The maker states Zialite will provide, without a strike solution, a perfect nickel plate for polishing to a high lustre finish, or for an undercoat on chromium work.

A circular available from the Tuttle company says Zialite's advantages include high throwing power for reaching all recesses; no burning of high spots or corners; low current density operation (7 to 12 amperes per sq. ft.); permanency with directed maintenance; no fouling by dissolved zinc; high anode efficiency; uniformly dense, adherent deposits of nickel.

The company offers to plate samples of zinc or zinc-base die-cast work for comparison and test.

Equipment and Supply Catalogs

Bronze. Chase Brass and Copper Company, Inc., Waterbury, Conn. Illustrated 32-page catalog on Olympic Bronze, a new high copper alloy containing silicon and zinc, designed especially for structural and engineering purposes. Gives full metallurgical and mechanical data. (119)

Refractories. General Refractories Company, 106 South 16th Street, Philadelphia, Pa. Bulletin on Carbex silicon carbide brick. (120)

Respirator Helmet. W. W. Sly Manufacturing Company 4700 Tram Avenue, Cleveland, Ohio. Bul. S-68 on Purair helmet for sandblasters, welders, fume protection, etc. (121)

Resistance Thermometers. Brown instrument Company, Philadelphia, Pa. Cat. 9001, 32 pages, illustrated. (122)

Electric Furnaces. Hevi Duty Electric Company, Milwaukee, Wis. Bul. HD-334. Illustrated circular showing furnaces in many industrial and laboratory applications. (123)

Air Compressors. Worthington Pump and Machinery Corporation, Harrison, N. J. Bull. L-621-S4. Units for small shops. (124)

Melting Furnaces. United Furnace Engineering Company, Inc., 90 West Street, New York. Illustrated bulletin on Meltomat automatic machines. (125)

Chemicals. E. I. du Pont de Nemours and Company, Inc., The R. & H. Chemicals Dept., Wilmington, Del. New quarterly price list of chemicals. (126)

Scales. The Kron Company, Bridgeport, Conn. Cat. 7, industrial dial scales; fully illustrated. (127)

Cyanides. R. & H. Chemicals Department, E. I. du Pont de Nemours and Company, Wilmington, Del. Interesting booklet listing cyanides of precious metals for gold and silver plating; certain dips and solutions used in plating; and method of silver solution analysis and other technical data. **Chemical Price List** for second quarter is also available from R. & H. (128)

Control Instruments. Esterline-Angus Company, Indianapolis, Ind. Booklet and circular No. 34, both illustrated. (129)

Tellurium Lead. National Lead Company, 722 Chestnut Street, St. Louis, Mo. Bul. F 38-34. Illustrated circular on lead alloyed with 0.1% tellurium, a new product said to have remarkable properties. (130)

Heating Equipment. Harold E. Trent Company, 618 North 54th Street, Philadelphia, Pa. Bul. TB 30. Electric units, elements, etc., for immersion and strip heaters. Illustrated. (131)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following bulletins mentioned in May: .....

.....

I want information on the following equipment or materials also: .....

.....

New Thickness Test for Udylite Coatings

A new stripping test has been developed by the Udylite Process Company, Detroit, Mich. The purpose of a stripping test is to determine the thickness of the applied coating and form a basis for thickness specifications, the greatest factor in the protective value of a plate. Moreover, the important thing is not the average thickness of plate but the minimum thickness at any point of the total surface.

All tests which are now used and recommended are maximum thickness tests. They do not show the weak points of the plates and, therefore, do not give a definite indication of the value of the coating. Consequently, a minimum thickness test must be used. The new Udylite stripping test, it is claimed, gives this minimum thickness accurately. It points the way to improvement of quality, and has greater accuracy and reliability than the old test.

Complete Equipment for the Udylite Strip Test —Two Bottles of Reagent and Two Small Dishes

Method of Testing

The method of testing is very simple. Two solutions are used, 5A and 5B. These are poured into two testing cups. The object to be tested is immersed in the cup containing 5A and kept there for 15 seconds. It is then rinsed in water and inspected. If the whole surface is covered with a brown film, the minimum thickness of the plate is at least .00005 inch. The film is now removed by rinsing in the cup containing 5B, rinsed in water and immersed for another 15 seconds in 5A. The inspection now shows if the minimum thickness is greater than .00010 in. This procedure is repeated until the base metal stands out against the brown film on the plate, which is the end-point. If, for example, the end-point was reached after five 15-seconds immersions, the minimum thickness of plate was at least 4 x .00005 = .0002 inch.

If brass is the base metal it will not stand out very well against the brown film. It will, however, show plainly against the white plate after the object has been rinsed in dip 5B.

The total time for each .00005 inch is about ½ minute and a .0002 inch plate is tested in about 2½ minutes. In view of the superiority of this new test, the old one is being discontinued. A quart of 5A and a quart of 5B sell at the same total price as a quart of the old stripping test, it is stated.

News of Associations and Societies

American Electroplaters' Society

Convention Program

The annual convention of the American Electroplaters' Society will take place at the Hotel Statler, Detroit, Mich., June 11 to 14, inclusive. The program of technical sessions includes the following papers and addresses:

Monday—June 11, 1 p. m.

"Summary of Researches on Plating at the Bureau of Standards"—Dr. W. Blum, Bureau of Standards, Washington, D. C.

"Complete Report of Exposure Tests on Plated Steel with Recommendations"—P. W. C. Strausser, Research Associate for the A.E.S., and Dr. W. Blum.

"Plans for Investigating the Plating of Non-Ferrous Metals"—Dr. W. Blum.

"Testing of Plated Metals for Compliance with Federal Specifications"—M. R. Thompson, Bureau of Standards.

Formal Discussion of Mr. Thompson's Paper—By M. Phillips, General Motors Corporation, Detroit, chairman, Joint Committee on Specifications for Plating.

Tuesday—June 12, 9 a. m.

"Nickel Plating"—Ray Goodsell, Racine Plating Works, Racine, Wis.

"Bright Nickel Plating"—L. E. Eckelmann, Pyrene Manufacturing Company, Newark, N. J.

"Relation of Coating Thicknesses to Service Life on Zinc Die Castings"—E. A. Anderson, New Jersey Zinc Company, Palmerton, Pa.

"Ductility and Adhesion of Nickel Deposits"—F. P. Romanoff, Apollo Metal Works, La Salle, Ill.

Tuesday—June 12, 8 p. m.

"Detergent Properties of Alkalies. Part I, Plating Room Cleaners"—N. Promisel, Research Electrochemist, International Silver Company, Meriden, Conn.

"Pictorial Study of Plating Conditions"—William M. Phillips, Research Engineer, General Motors Corporation, Detroit, Mich.

"Does Chemical Control of Plating Solutions Solve the Electroplaters' Problems?"—George B. Hogaboom, Research Engineer, Hanson-Van Winkle-Munning Company, Matawan, N. J.

Wednesday—June 13, 9. a. m.

"Recent Progress in Industrial Cleaning"—R. W. Mitchell, Magnus Chemical Company, Garwood, N. J.

"Plating Plant Layout"—A. J. Lupien, Udylite Process Company, Detroit, Mich.

"Copper Cyanide Plating, Its Peculiarities"—Elmer Woodmansee, Detroit Branch.

"Concentrated Cyanide Plating Baths"—Dr. L. E. Pan, U. S. Research Corporation, Long Island City, N. Y.

Thursday—June 14, 1 p. m.

"Rust Proofing before Color Finishing"—R. R. Tanner, Metal Finishing Research Corporation, Detroit, Mich.

"Rubber in the Plating Industry"—R. H. Kittner, American Hard Rubber Company, Akron, Ohio.

"Some New Developments in Buffing Compositions"—Geo. M. Cunningham, National Oil Products Co., Harrison, N. J.

"Chromium Plating on Sheet Zinc"—Charles H. Proctor, New York Branch; founder of the society.

Milwaukee Branch

The annual educational meeting, followed by a smoker, was held April 7, with the largest attendance Milwaukee Branch has ever had at this event. There were delegations from out of town, including representatives from the branch at Chicago, and platers from Two Rivers, St. Paul, Minneapolis, Manitowoc, Sheboygan, Ken-

osha; Racine, Burlington, Madison, Beaver Dam, La Crosse and other places up to 400 miles away. The educational session heard the following speakers:

George B. Hogaboom of Hanson-Van Winkle-Munning Company, Matwan, N. J., on Results of Recent Exposure Tests of Electroplated Coatings.

Gustav Soderberg of Udylite Process Company, Detroit, Mich., on Developments in Cadmium Plating.

H. A. Gilbertson, national secretary, spoke on The Benefits of Membership in the American Electroplaters' Society.

A buffet lunch followed the session, and a very fine floor show was put on. The Branch provided an evening which will long be remembered by all who attended, and public recognition is hereby given to the members who arranged it and aided in the success of the event.

The Committee.

Master Electroplaters' Institute

Tentative arrangements for a well-balanced program of business meetings, informative discussions, and entertainment have been completed by the Master Electroplaters' Institute, which will hold its first annual meeting starting at 9 A.M. Saturday, June 9, and close Sunday evening, June 10.

The first session will give delegates an opportunity to register, get acquainted, and file suggestions, reports and petitions from local associations. A luncheon will follow.

At the Saturday afternoon session delegates will hear reports of the treasurer, executive secretary, Code Committee and Cost Committee; and other items of business.

The meeting will recess in the late afternoon to return for a session at 8:00 P.M., to hear a discussion on "Controlling an Industry Through Its Trade Association," conducted by one of the foremost counsellors of Human Relations in Industry, Harry Newton Clarke of Cleveland, Ohio, if it is possible to get his services. This will be followed by refreshments and entertainment.

A breakfast at 9 A.M. Sunday, will be followed by a business session and election of officers. Sunday afternoon may be devoted to recreation.

The meeting will close Sunday night with a banquet which is scheduled to begin at 6:30 P.M. Chief speaker will be an authority on NRA who will come from Washington to give the delegates the latest information in respect to governmental developments affecting industry.

It is the purpose of the Committee to keep the registration fee at about $5.00 and to include in it not only the speakers, entertainment and transcript of the meetings, but also the banquet, the Sunday morning breakfast, and the refreshments Saturday night, if possible. The Committee is making arrangements for conference railroad rates. Advance information, registration blanks, applications for conference rates and other literature will be in the mail early in May. Electroplaters from all sections of the country, whether members of the Institute or not, will be invited to attend this meeting and to participate in all discussions.

Further information may be secured by addressing M. M. Wise, Chairman, Committee on Arrangements, 8735 East Jefferson, Detroit, Michigan, or Hugh Booth, Executive Secretary, same address.

PLATERS' CONVENTION INFORMATION

American Electroplaters' Society

Annual Convention

Place: Hotel Statler, Detroit, Mich.

Time: June 11 to 14, inclusive.

Events: Educational sessions; exhibits of plated work; plant visits; Annual Banquet; Annual Outing; special trips for the ladies.

Address: Convention Committee, American Electroplaters' Society, Hotel Statler, Detroit, Mich., will receive all communications.

Master Electroplaters' Institute

Annual Meeting

Place: Hotel Statler, Detroit, Mich.

Time: June 9 and 10, immediately preceding platers' convention.

Events: Discussion of industry's problems, viewed from job platers' angle; entertainment.

Address: Hugh Booth, executive secretary, 8735 East Jefferson Avenue, Detroit.

International Fellowship Club

Annual Meeting

Place: Hotel Statler, Detroit, Mich.

Time: During the convention of the American Electroplaters' Society.

Events: Election of officers; discussions of topics of interest to representatives of plating and finishing equipment and supply manufacturers.

Address: T. A. Trumbour, secretary, care of Metal Industry, 116 John Street, New York.

Metal Trade Association

National Metal Trades Association held its annual convention April 25-26, at New York. Alexander Sellers of Philadelphia was elected president, succeeding Jacob D. Cox, Jr., of Cleveland. Other officers elected:

Charles H. Strawbridge, Chicago, first vice president; N. W. Pickering, Ansonia, Conn., second vice president; Harold C. Smith, Chicago, treasurer; E. B. Baltzly, Muncie, Ind.; Jacob D. Cox Jr., Cleveland; Harold Falk, Milwaukee; D. F. O'Brien, East Orange, N. J.; F. H. Payne, Erie, Pa., and A. H. Timmerman, St. Louis, councilors for two years.

Harry S. Flynn will replace J. E. Nyhan as national secretary in Chicago on May 1, it was announced.

American Zinc Institute

The 16th annual meeting of the American Zinc Institute was held at the Statler, St. Louis, Mo., April 30 and May 1. After customary business, a review of world zinc conditions was given by Oliver Roskill of London, England. J. D. Conover, the secretary, addressed the meeting on Development of the Zinc Code. R. M. Roosevelt, president of the Institute, spoke on Organization of the Zinc Institute and its Relation to the Code.

Connecticut Nonferrous Foundrymen

The Manufacture and Use of Composition Ingots was the subject of W. Kelley of the Nassau Smelting and Refining Company, New York, who spoke at the April meeting of the Connecticut Nonferrous Foundrymen's Association. He was aided by W. H. Jacobson of the same company, in answering questions prompted by the address. There was a large attendance.

The meeting to be held May 8, at Hotel Garde, New Haven, preceded by dinner at 6:30 P. M., will hear A. L. Gardner of Pangborn Corporation, Hagerstown, Md., on Blast Cleaning and Dust Collecting.

The June meeting will be given over to an entertainment, after which there will be a recess until the fall.

L. G. Tarantino, Secretary.
523 West Taft Avenue,
Bridgeport, Conn.

Personals

Herbert J. Astle

Last month we briefly mentioned in our news column that H. J. Astle and Company, Providence, R. I., is this year celebrating its fiftieth anniversary.

Herbert J. Astle founded the company April 8, 1884, and has since then continued to guide and direct its fortunes, and

HERBERT J. ASTLE

is today its active president and treasurer.

Beginning as a maker and distributor of cans, pails and other items of tinware, the Astle concern has grown into a large maker of equipment for the jewelry, metal-working and other industries. Among its present products are the well-known "Boland Systems" for dust exhaust, polishing and other shop operations; machinery of various kinds for jewelry fabrication; drying equipment for the textile industry; restaurant and bar equipment, and many items for household use that are known to housewives everywhere.

Mr. Astle was joined a year after he went into business by another young man, Francis P. Boland, who became vice-president and general superintendent of the company when it was incorporated in 1921. The "Boland Systems" are among his inventions. Equipment that he devised and patented is widely known throughout the world, being in use extensiveiy in jewelry and other lines of manufacture.

Operating in its early days with half a dozen men, the Astle plant now occupies five stories in one building, a machine shop in another, and has warehouses besides. Mr. Astle continues to take an active part in the affairs of the company, working with a vigor surprising after his fifty years of business life. He was aided by Mr. Boland until the latter's death in 1927, at which time Elijah Astle, who had previously been secretary, became vice-president, and Charles W. Littlefield became secretary. Edmund McLaughlin, who has been with the company since he was thirteen was made manager of the jewelers' machinery department.

Looking back pleasantly upon fifty years of successful business and industry, Mr. Astle still looks forward to more, giving no thought to retirement.

John Bauer has returned to the Hanson - Van Winkle - Munning Company, Matawan, N. J., and will take charge of the company s Philadelphia office. Mr. Bauer was with the company once before as advertising manager.

G. A. Baker, formerly manager of the Buffalo office, has been transferred to the general offices of the Duriron Company, Dayton, Ohio, where he will specialize on sales of Durimet and Durco alloy steels. **Col. M. W. Smith,** of the general offices, has taken over temporarily the management of the Buffalo office.

A. J. Howell has been appointed Pacific Coast district manager for Revere Copper and Brass, Inc., New York, to succeed **R. H. Binns, Jr.,** who is now assistant general sales manager at the executive offices. Mr. Howell has been on the coast for Revere since 1932 when the office there, at Russ Building, San Francisco, Calif., was set up. Before that he was with the Rome Division of Revere for many years. Pacific Coast branch sales are maintained at Los Angeles and Seattle, Wash.

F. J. Hackett has been elected vice-president of the Riverside Metal Company, Riverside, N. J. Mr. Hackett has been general manager of the company since 1920. Before that he was superintendent for the Seymour Manufacturing Company, Seymour, Conn.

H. Donn Keresy, president, Anaconda Wire and Cable Company, New York, is directing a campaign in the nonferrous metals industries in behalf of the Citizens Appeal for the Salvation Army.

Jacob Hay, well known electroplater, has become associated with the Standard Plating Works, Goshen, Ind., large plating concern. Mr. Hay is chairman of the Research Committee of the American Electroplaters' Society. He was previously with Eaton Axle and Spring Company, Cleveland, and before that with Hall Lamp Company, Detroit.

John F. Roche, vice-president of Binks Manufacturing Company, Chicago, Ill., makers of spray equipment, is a member of the Illinois Advisory Board of the National Emergency Council.

H. S. Colby has been appointed general sales manager of Combustion Engineering Company, New York.

H. C. Bauer of Revere Copper and Brass, Inc., Chicago, Ill., has been elected to the board of governors of the Purchasing Agents Association of Chicago.

William J. Pettis

William J. Pettis, who recently resigned from the National Brass and Copper Company, Lisbon, Ohio, has long been a familiar figure to readers of **Metal Industry.**

Mr. Pettis started in the brass rolling mill industry with the Randolph and Clowes Company of Waterbury, Conn., in 1895. He worked up through foremen's positions in various departments until he was made superintendent of the casting shop.

On October 11, 1915, he was employed by the National Brass and Cop-

WILLIAM J. PETTIS

per Company. His work was to install the equipment for the production of sheet and strip brass for war purposes. The mill was devoted only to copper sheet production, but his work had to be started from the ground and built up. Mr. Pettis trained men for the positions of casters, tenders, rollers and other positions calling for skill. Natural gas was used as a fuel for the pit fires for the first time in the history of brass rolling and the operation was successful.

In 1920 Mr. Pettis left to become superintendent of the newly built West Virginia Metal Products Company. When this mill failed, he was called back to the National Brass and Copper Company in 1921.

Mr. Pettis has no immediate plans at this time except to take a vacation.

Obituaries

E. W. Heil

The plating industry lost one of its prominent figures through the death on March 31, 1934, of E. W. Heil, who was in charge of plating for the Coleman Lamp and Stove Company, Wichita, Kan., for more than 30 years.

E. W. HEIL

He was 59 the day of his death, which was caused by heart disease.

Mr. Heil was born in Junction City, Kan., but was taken to Wichita when only a year old. There he grew up and entered industry, becoming a highly skilled plater. He joined the Coleman company about the time it started its plating department, and he had charge of it practically from the beginning. During his career he contributed considerably to the development of electroplating. One of his ideas was commercialized as the Heil foot ampere meter, a device which facilitated determination of current densities in plating.

About 18 years ago Mr. Heil developed a method of doing some of the work at the Coleman plant which effected large savings in time, space and equipment, and improved the results as well. Plating thousands of lamp bases required considerable space. The plating time was 30 minutes by the old method. Mr. Heil developed a means of rotating the bases while plating them, and cut the plating time to five minutes by using 30 amperes.

A progressive, alert man, Mr. Heil made his ideas widely known through the many papers he read before the conventions of the American Electroplaters' Society, in which he had held some of the high offices. He was considered in the industry to have been an outstanding plater, at one time probably one of the five best in the country.

Mr. Heil is survived by his wife and two sons.

George A. Boomer

George Andrew Boomer, manager of the Plume and Atwood Manufacturing Company, Waterbury, Conn., died of a heart attack March 28. He had been to business as usual and had no indication of illness until stricken.

He was born in Chicago, July 19, 1875, and went to work for the local concern in 1894 as a clerk in the Chicago office. Later he was a salesman for the company, and in 1900 became its representative at San Francisco. In 1915 he was transferred to Waterbury as sales manager, and since 1932 has been manager and director of the company.

W. R. B.

Thomas B. Kent

Thomas B. Kent, who was vice-president of the American Brass Company, Waterbury, Conn., until it was merged with the Anaconda interests died last month of heart disease, aged 86.

Mr. Kent was a leader in the brass industry for many years during his long business career. He was president of the brass firm of Holmes, Booth and Hayden at Waterbury, Conn., until it was merged with the American Brass Company and then took office with the latter.

George H. Barbour

George Harrison Barbour, chairman of the board of the Detroit Michigan Stove Company and founder of the Michigan Copper and Brass Company, died March 27, 1934, aged 91. He was president of the brass mill company from 1913 to 1915. He had a distinguished career in industry, and was first president of the Michigan Manufacturers' Association and of the Detroit Board of Commerce. He was a director of the United States Chamber of Commerce for two years.

Fred A. Geier

Fred A. Geier, president of the Cincinnati Milling Machine Company, Cincinnati, Ohio, and one of the organizers in 1901 of the National Metal Trades Association, died of heart disease March 27, 1934. Mr. Geier was also president of the Modern Foundry Company and a number of other companies, and a director in many corporations.

Patrick H. Leen

Patrick H. Leen, president of the Fewless-Leen Brass and Iron Company, Cincinnati, Ohio, died April 8, 1934, aged 73. He had been an official of the foundry for 32 years.

Fred Haushalter

Platers throughout the country who have known him as a figure at various functions of the plating industry for many years will be saddened to hear that Fred Haushalter of New York died April 6, 1934. Mr. Haushalter lived at 104—46th Street, Richmond Hill, New York City, and was active in the New York Branch of the American Electroplaters' Society for many years. He was a past president of that branch, and through his local activity as well as his attendance at many annual conventions of the A. E. S., was known to platers everywhere as a genial and friendly as well as a highly progressive man.

FRED HAUSHALTER

Samuel T. Johnston

Samuel T. Johnston, who until his retirement in 1932 was vice-president of S. Obermayer Co., Chicago, died of pneumonia at his home in Riverside, Ill., on April 23. A native of Scotland, Mr. Johnston was a past president of the American Foundrymen's Association and the Foundry Equipment Manufacturers' Association. He was 68 years old.

Eugene R. Bailey

Eugene R. Bailey, former secretary of the Grasselli Chemical Company, Cleveland, Ohio, died at that city March 31, 1934, aged 69. Mr. Bailey began his career with Grasselli in 1885 as a shipping clerk.

Alfred J. Jupp

Alfred J. Jupp, a vice-president of the Lunkenheimer Company, Cincinnati, Ohio, died suddenly while on business in New York on April 10, 1934, aged 60.

James D. Erskine

James Drummond Erskine, former president of the Rome Brass Radiator Company, Rome, N. Y., died April 19, 1934, at a hospital near his home at Glen Cove, Long Island.

Industrial and Financial News

Roxalin Opens New Plant on Tenth Anniversary

Roxalin Flexible Lacquer Company celebrated its tenth anniversary last month by the opening of its new plant at 800-814 Magnolia Avenue, Elizabeth, N. J. The location is a 30-minute drive from New York, via the express highway Route 30. The company's production and service facilities have been considerably enhanced, and there is a railroad siding for shipment and receipt of materials.

Roxalin has stepped up operations having installed much new and modernized equipment. The laboratories have especially benefitted by more spacious quarters.

Chicago Fair Re-Opening

A Century of Progress, international exposition at Chicago, Ill., will re-open June 1, for a second season. Preliminary announcements state that a great deal has been added to the amusement and educational facilities, and that all the major scientific and industrial displays seen last year will be on view. Last year 22½ million admissions were sold, and each visitor spent an average of $1.17 on the grounds besides admission.

Research in Bronze

Research looking toward improving the quality of copper castings is being sponsored by the Falcon Bronze Company, Youngstown, Ohio. C. H. Lorig will take charge of the project, which will be carried on at Battelle Memorial Institute, Columbus, Ohio.

Lead in Storage Batteries

The manufacturers of lead storage batteries in the United States used about 147,000 short tons of lead and antimony in 1933, compared with 138,000 tons in 1932, and 157,000 tons in 1931, according to the American Bureau of Metal Statistics.

Bandits Rob Wire Plant

Three armed men with sub-machine guns entered the offices of the Habirshaw Wire and Cable Company, Yonkers, N. Y., April 13, held up the paymaster and four clerks, and made off with $7,000 of payroll money.

General Bronze Control Dispute Settled

Control of the General Bronze Corporation, New York, remained with the management after the annual meeting last month disclosed that some stockholders had sought to take control away from the group headed by John Polachek, who remains president. Directors elected under terms of an agreement were W. T. Smith, B. P Goodman and A. W. Britton, succeeding Edmund Peremi, F. G. Evatt and Edouard Counand, who were not renominated. Mr. Polachek and E H. Geiger, vice-president, were re-elected directors.

National Brass to Expand

The National Brass and Copper Company, Lisbon, Ohio, manufacturer of plate, sheet, strip, anodes, etc., has undergone changes in excutive personnel and plans to obtain a Delaware charter under which it will be able to branch out in a manner not possible under its present Ohio charter.

Floyd Rose, vice-president of the Vanadium Alloys Steel Company and of Colonial Steel Company, both at Pittsburgh, Pa., is now board chairman of National Brass. C. W. Hays is the new president. Both have acquired an interest in the company. Mr. Rose will devote part of his time to directing sales activities, a sales staff having been added to the organization. Other officers are J. L. Goldsmith, vice-president; M. Goldsmith, secretary-treasurer; H. T. Dawes, assistant secretary; George W. Case, sales manager; George Hempstead, mill superintendent. B. Goldsmith, formerly a head of the company, has retired but retains a large interest.

The company plans to improve its mill at cost of several hundred thousand dollars, according to Mr. Hays, who has been associated with B. Goldsmith at the Lisbon plant for the past five years.

Metal Developments

Duraluminum alloy construction is planned in a giant super-airplane for stratosphere flights, designed by a Soviet Russian engineer.

Tin coatings giving an effect of lustrous silver have been applied to furniture shown at the British Industries Fair. The tin is sprayed on, leaving the graining of the wood visible.

Aluminum tanks of arc welded construction are in better demand, according to Lincoln Electric Company, Cleveland, Ohio, who attribute this to improved arc welding methods.

Bronze again appears in "popular" literature. A new book "Hand of Bronze" is advertised as "a newspaper story of love and social tension in the HERE and NOW." Without having read the book, and therefore passing no judgment, we venture to guess that while bronze may profit from such free publicity, it will also continue to exist without it.

Producers Using Design as Metal Goods Sales Aid

The Industrial Arts Exhibition, held last month at Rockefeller Center, New York, made fully evident the extensive use which designers of commercial products are making of metals and finishes. Metal products, including those used as parts or decorative elements of large assemblies were more numerous than any other type among the 750 items shown. The purpose was to stress the importance of design and to demonstrate that beauty and sales value are complimentary. The trend toward a national style in design was also emphasized.

The show included the work of many of the leading design artists of the country, whose services are being increasingly used by the manufacturers. There were articles of hardware, heating and lighting equipment, electrical devices, table ware, automotive, architectural and decorative objects, household equipment, finishes, basic materials, and manufacturing services. Every item bore the designer's name and that of the firm which adopted the design and put it in production.

Makers or distributors of basic materials who were represented in the exhibition included Chase Brass and Copper Company, New York; E. I. du Pont de Nemours and Company, Wilmington, Del.; International Nickel Company, New York; New Jersey Zinc Company, New York; Philip Sievering, New York, showing the Alumilite process of aluminum finishing; United States Rubber Company, New York.

New Incorporations

Kingston-Conley Electric Company, 66 York Street, Jersey City, N. J.; to make fractional horsepower motors; $100,000; by F. S. Kingston and B. L. Conley, formerly with Sunlight Electric Company, Warren, O., as vice-president and chief engineer, respectively

Pressure Castings, Inc., 12435 Euclid Avenue, Cleveland, Ohio; $35,000; by W. H. Rosenfeld, N. F. Jacobs and E. Gordon; to manufacture brass, bronze, aluminum and zinc die castings, using equipment patented by N. N. Lester, who is vice-president and chief engineer of the company.

Sanitary Metal Cap Corporation, Syracuse, N. Y.; by D. W. McPike, 564 Roberts Avenue, and associates; to make metal caps and kindred products. Company is in market for aluminum foil 4" wide, .0035" thick.

Michigan Die Casting Company, Inc., 253 St. Aubin Avenue, Detroit, Mich.; to manufacture die castings; L. W. Blauman, president and treasurer; E. M. Tallberg, vice-president and secretary. Plant is fully equipped in production.

Business Items---Verified

Royal Brass Manufacturing Company, Cleveland, Ohio, makers of plumbers' goods, has issued some new folders on shampoo and lavatory faucets.

St. John X-Ray Service, Inc., 30-20 Thomson Avenue, Long Island City, N. Y., specialists in X-ray and radium inspection and equipment, will give a course in metal radiography at its laboratory for four days during the week of July 2. Arranged for out-of-town people, the course will come after the Atlantic City meetings of the A.S.T.M.

Union Carbide and Carbon Corporation, New York, has taken space in the Hall of Science at A Century of Progress, Chicago, Ill., and will again exhibit many of its basic science contributions, including its "Story of the Electric Furnace," welding processes and development of metals.

John D. Ward Brass Foundry, Inc., formerly at Elmira, N. Y., has resumed operation in the Newark Creamery Building, Wellsburg, N. Y., its plant having been destroyed by fire February 16. It has 50% more employees than formerly, it is stated, the present force being 35, with an increase to 50 expected soon. **John D. Ward,** proprietor, was founder of the Chemung Foundry, and was president there until 1932, when he started the present firm, which makes plumbing goods

The B. F. Goodrich Rubber Company, Akron, Ohio, and its subsidiaries have adopted a retirement pension plan for all workers.

W. B. Jarvis Company, Grand Rapids, Mich., making automobile hardware, is reported operating at the highest rate in its history, producing 80,000 to 110,000 units daily. Nickel and chromium plated hardware orders in good volume are said to be on hand from a number of large users.

Aluminum Industries, Inc., Cincinnati, Ohio, has opened a new warehouse at Dallas, Texas to serve jobbers in that state, Arkansas, Louisiana and Oklahoma. Company now has 11 such branches.

Revere Copper and Brass, Inc., New York, has arranged to sell and distribute "Streamline" soldered fittings made by **Streamline Pipe and Fittings Company,** Port Huron, Mich., a division of **Mueller Brass Company.** The maker will aslo sell the products; the plan does not affect present sales policies of either firm. Revere will use its mills as distributing points for the added line, which will supplement Revere's sales of copper water tubing.

Kewaskum Aluminum Company, Kewaskum, Wis., has completed arrangements to have **Larsen and Shaw, Ltd.,** Walkerton, Ont., take Canadian manufacture of Kewaskum tin-lined copper utensils and gift ware, for which demand is reported growing.

Pennsylvania Metal Products Company has acquired plant and equipment of J. C Black Manufacturing Company, Oil City, Pa., and plans immediate resumption of operations, operating press room, machine shop, brazing, plating, polishing, grinding, lacquering, japanning, tinning and soldering departments. Company is in market for hollow or solid brass balls ½" to ¾" diameter.

Zero Valve and Brass Corporation, Buffalo, N. Y., filed a voluntary petition in bankruptcy April 12, listing $18,016 liabilities and $13,473 assets.

Geuder, Paeschke and Frey Company, Milwaukee, Wis., stamped and pressed metal division, has made appointments as follows: Metropolitan district, **A. L. Nacke,** 50 Church Street, New York; New England, **G. D. Morse,** 542 High Street, West Medford, Mass.; Cleveland, **G. A. Reinhard,** 1935 Euclid Avenue.

Handy and Harmon, 82 Fulton Street, New York, has appointed **Air Reduction Sales Company** distributor of Sil-Fos low melting point brazing alloy. The latter will carry the product at all of its "Airco" stations throughout the United States. It is also handled by a great many supply houses, it is stated.

Industrial Lubrication Company, Milwaukee, Wis., has changed its name to **Oil-Rite Corporation,** and has moved to 623 North 2nd Street from former location at 606 West Wisconsin Avenue. Company manufactures lubricating equipment and is in market for a small high-speed drill.

Mine and Smelter Supply Company, Denver, Colo., has moved its New York offices from 225 Broadway to General Motors Building, 1775 Broadway, where the company's eastern business is handled by **J. P. Bonardi** and **H. M. Jennings.**

Annual Earnings of Companies

Net profit unless preceded by (L) which means net loss.

	1933	1932
Aluminum Company of America, Pittsburgh, Pa.	$1,664,547	(L)$2,172,732
Anaconda Wire and Cable Company, New York	(L) 213,872	(L) 1,045,110
Doehler Die Casting Company, Toledo, O.	232,933	(L) 98,497
Gorham, Inc., Providence, R. I.	(L) 326,448	(L) 751,268
Niagara Falls Smelting & Refining Corp., Buffalo, N. Y.	3,661	(L) 12,649
Wolverine Tube Company, Detroit, Mich.	48,358	25,245

Reports for first quarter:	1934	1933
Bohn Aluminum & Brass Corp., Detroit, Mich.	649,953	100,602
Federal Mogul Corporation, Detroit, Mich.	35,123	(L) 39,000
General Cable Corporation, New York	(L) 329,726	(L) 976,978
International Silver Co., Meriden, Conn.	56794	(L) 362,319
Parker Rust Proof Co., Detroit, Mich.	280,816	64,796
Yale & Towne Mfg. Co., Stamford, Conn.	21,245	(L) 107,093

News From Correspondents

New England States

Waterbury, Connecticut

May 1, 1934.

A 10% raise in pay was given to practically all workers in the plants of **American Brass Company, Scovill Manufacturing Company** and **Chase Companies, Inc.,** last month. It is estimated that between 10 and 11 thousand employees will benefit. American Brass raised all a straight 10%. Scovill increased by 10% the wages of hourly workers, and increases were given the piece work employees approximating that. Increases by Chase varied, but they averaged 10% for all hourly and piece work employees. All of the increases were voluntary. It is understood that the hourly and piece work scale is now higher than in 1929 because at the time the NRA went into effect substantial increases were given. However, as the time worked weekly is less, due to code limitation of hours, the weekly amount received is not so great, and the men work fewer hours.

Chamber of Commerce survey for March shows a net increase of 637 persons employed in the major group of local factories as compared with February, and 6,612 over March, 1933.

Officers of the **American Brass Company** were reelected last month as follows: President, John A. Coe; vice-president, Clifford F. Hollister; vice-president, Clark S. Judd; treasurer, Clifford F. Hollister.

American Brass has been awarded a

contract for 1,800,000 pounds of cartridge brass cups for the Navy at its bid of 14.54 cents a pound. Other bids, including some from other local factories ran to almost a cent a pound higher. American Brass has also received an order for 1,000,000 pounds of high strength bronze cable to be used on the electrification of the Wilmington-Washington line of the Pennsylvania railroad. It is estimated that this means that approximately 15,000 additional man hours of labor will be given to the employees of the Waterbury, Torrington and Ansonia plants of the concern.

Francis T. Reeves, for some time counsel for the company, was elected secretary of the **Scovill Manufacturing Company** at the annual meeting last month. He succeeds **William M. Goss,** who was elected a vice-president. Other officers were re-elected.

Chase Companies, Inc., is entering the electric lighting fixture business. For the past three years, according to **Rodney Chase,** assistant secretary, the company has been studying every angle of the fixture industry and has carried on an extensive personal survey of all important dealers in the industry. From these the company has evolved definite plans regarding the line and its distribution. The coming Chase line is newly designed in every part by professional designers, and will sell at moderate prices. The company, this month will open its new exhibition rooms at 10 East 40th Street, New York, and will have its fixture lines on display there. **Earl F. Copp** is in general charge of manufacture and selling, and **Clement E. Horton** is directly in charge of sales.

Increases of approximately 7 cents an hour have been given employees known as "trainers" at the **Waterbury Clock Company,** and it is understood similar increases will be given the "vibrators" and "escapers." Several increases were given during the latter half of last year varying from 33 1/3% to 45%. The recent increase probably prevented presentation of a demand by the local branch of the International Jewelry Workers Union for a flat increase in pay. A few days before the increase, the executive committee of the union had drawn up a resolution declaring that the merchandise manufactured and sold by the company is enjoying prices enough higher now than in the recent past to justify an increase, and a mass meeting had been called to vote on this resolution. As the increase was granted just before the mass meeting, the resolution was not voted on.

Beardsley and Wolcott Manufacturing Company is receiving orders amounting to more than $1,000 every day, sufficient for profitable operation, and business is improving every day, the superior court was informed last month. Because of this, he gave **James R. Sheldon,** receiver and former president, permission to continue to operate it. A proposed sale of the assets to trustees for the creditors, with a subsequent reorganization, is awaiting a decision on a loan from the RFC. W. R. B.

Connecticut Notes

May 1, 1934.

HARTFORD—With the sanction and announced cooperation of William Green, president of the American Federation of Labor, 1,300 workers of the **Arrow-Hart and Hegeman Company** went out on a strike last month because of the failure of the company to grant a demand that it raise the minimum rate from 33 1/3 to 40 cents an hour for women workers, give a 20% increase to others, including skilled, unskilled, and salaried employees, and set a minimum rate of 75 cents an hour for set-up men. President John R. Cook and Vice-President Samuel P. Williams said the demands were excessive.

NEW BRITAIN—Officers of **Fafnir Bearing Company,** headed by the chairman of the board, E. H. Cooper, and President Maurice Stanley were reelected last month. The business of the company was reported as improved over the previous year.

Landers, Frary and Clark is selling its new electric refrigerators as fast as they are ready for delivery, and the weekly output amounts to nearly 1,000 a week.

BRIDGEPORT—**Bridgeport Brass Company** has received the contract to supply bronze castings and pole hardware required by the Pennsylvania Railroad in connection with the electrification of its lines into Washington, D. C.

NORWALK—**Segal Lock Company** is going into production with a line of new metal containers to be used by the toilet preparation trade.

Stamford—Yale and Towne Manufacturing Company and subsidiaries report a net profit from operations of $36,307 for 1933 compared with a loss of $780,222 in 1932.

WALLINGFORD—**R. Wallace and Company,** silverware manufacturers, gave a 10% increase in wages to about 1,000 employees last month. W. R. B.

Middle Atlantic States

Trenton, New Jersey

May 1, 1934.

Some Trenton plants reported increased business the past month.

Edgely Brass Company, Edgely, Pa., reports a number of new orders.

Harry A. Robinson of Philadelphia announces that he has completed negotiations for purchase of the entire plant, stock, patents, dies, molds, fixtures and good-will of the **J. L. Mott Company,** Trenton. The company was started over 100 years ago, and was the second largest industry in Trenton. The plant has approximately 1,000,000 square feet of floor space and 18 acres of ground, complete for manufacture of bath tubs, lavatories, plumbing supplies and pottery, brass goods and incidentals. Mr. Robinson reports foreign interests are negotiating for the plant, with the intention of continuing the manufacture of the Mott lines.

Noble Crain Harrison, assistant sales manager for John A. Roebling's Sons Company, died April 4 in a Philadelphia Hospital where he had undergone an operation. He lived at 917 Greenway Avenue, Edgehill Gardens, Morrisville, Pa. Mr. Harrison had been associated with the Roebling Company for 32 years.

Following concerns have been incorporated here:

Jerome S. Katz and Company, Inc., Jersey City, $50,000; refining metals. **Mid-Jersey Machine and Welding Company,** Elizabeth; $50,000.

C. A. L.

Newark, New Jersey

May 1, 1934.

Eastern Tool and Manufacturing Company, Bloomfield, N. J., will erect an addition to its plant along the Erie Railroad.

Former plant of Kaltembach and Stephens on Sherman Avenue has been leased to the **Dura Electric Lamp Company,** manufacturers of auto light bulbs.

R. C. A. Radiotron Company, Inc., Harrison, N. J., has leased a portion of the plant of the **General Cable Corporation,** New York, at Harrison, comprising 140,000 square feet. It was once occupied by the New Jersey Tube Works.

Engineering Glass Laboratories have leased a building at 32 Green Street for manufacture of electrodes used in neon signs.

Amersil Company, Inc., New York, manufacturers of American fused silica and quartz products has leased a building at Hillside.

C. A. L.

Middle Western States

Detroit, Michigan

May 1, 1934.

Production in industry has continued steady all through the last month, and has now reached the highest point since 1930. Heavy activity is expected to continue well along into the summer. Although every one seems confident of the future, there is still considerable caution concerning the purchase of supplies for future delivery.

The automobile industry is the center of attraction at present, including the manufacture of accessories and plating. All plants engaged in this work are operating near capacity.

Labor disputes have continued to

cause much concern. No sooner has one strike been settled than another begins. Most of these disturbances have developed in the accessory plants, shutting off supplies and slowing down or closing for brief periods some of the larger plants. Wage and time adjustments are easily settled. The trouble usually centers around union recognition. The industry remains opposed to anything it considers domination by the unions.

Warning is again necessary that labor from elsewhere can not yet be absorbed in Detroit. Non-resident workers are being advised to keep away unless they have sufficient funds to sustain them for some time.

Bates-Ludington Company Ludington, Mich., has received orders for 1,500 cylinder heads. Production, it is stated, is now more than 7,500 heads behind orders already received. Two eight-hour shifts are planned for the near future.

McAleer Manufacturing Company, Detroit, makers of polishing products, shortly will announce a complete line of automobile steam heaters, it is stated.

Fred L. Riggin, vice-president of the **Mueller Brass Company,** Port Huron, has been appointed a member of the code authority for the brass and copper mill products industry of the NRA. He is the only Michigan member.

American Brass Company announced a 10% wage increase to all employees, retroactive to April 1. It effects 1,100 employees in the Detroit plant at 174 Clark Avenue, according to S. H. Wardell, superintendent. This was their second increase within a year. The Detroit plant is working at capacity.

Kelvinator Corporation reports March shipments of 30,000 refrigerator units brought total shipments for the present fiscal year up to 79% ahead of the best first half in its history, and more than 100% over the 1933 first half year.

Parker-Wolverine Company has taken over the large plant on Martin Avenue, formerly occupied by the Wolverine Enameling Company, with all equipment. Parker-Wolverine is a merger of the Detroit metal finishing business of the **Parker Rust Proof Company** and the former Wolverine Enameling division. The merged organization is probably the largest exclusive metal finishing business in the Detroit area. F.J.H.

Chicago, Illinois

May 1, 1934.

Both the Federal Reserve Bank of Chicago and the Illinois state department of labor list the metal groups among those showing substantial gains in payrolls and employment.

Borg-Warner Corporation reported its business in March was 298% ahead of the 1933 period. **Borg-Warner Service Parts Company** has moved from its branch warehouse at 1617 South Michigan Avenue to larger quarters at 2100 Indiana Avenue in order to care for increased business from the 200 automotive parts jobbers in the Chicago district. This concern now has 13 branch warehouses throughout the country.

Sale of assets of **Grigsby-Grunow Company** has been set for April 30 by the referee in bankruptcy.

Studebaker receivers contemplate taking no steps toward completion of the consolidation of Studebaker and of White motor, which was anticipated prior to the receivership. Paul G. Hoffman, one of the three receivers, asserted that March orders, totalling 10,067 cars, were in excess of any previous month of the past five years. April orders also promise to exceed 10,000.

Cutler-Hammer, Inc., Milwaukee electrical equipment maker, reports largest first quarter shipments in three years. This is attributed in part to the government building program, to modernization of old structures, and to the building up of the Navy.

Matthieson and Hegler Zinc Company, La Salle's largest industry, has been inactive for more than three weeks as a result of a strike of its 650 workers.

Illinois Zinc Company, also of La Salle, has also been involved in a strike. Employees refused a wage increase offer of around 15% in the furnace department and from 7% to 10% in other divisions, and furnace operations were discontinued. Salaried employees not identified with the unions, and new workers, have been used to continue rolling operations. The concern employs 250 men, with 110 in the furnace division. R. G. K.

Pacific States

California

May 1, 1934.

Aviation manufacture in California apparently is growing apace. The state is now believed to lead the country in this line, with Los Angeles County producing about 90% of the state's output. The industry naturally makes use of a great deal of metal of all kinds.

Kinner Airplane and Motor Company, Glendale, is now making light weight ships; it previously specialized in motors.

Northrup Corporation, Inglewood, plans to enlarge plant.

Security National Aircraft Corporation, Downey, reports advance orders for light ships.

Airplane Development Corporation, Glendale, is building engines.

Menasco Manufacturing Company, 6714 McKinley Avenue, Los Angeles, is producing racing motors in good volume.

McClatchie Manufacturing Company, Compton, is operating a large engine plant.

Douglas Aircraft, Santa Monica, with 145 experts and 1500 skilled men, has been building military planes and has gone into a line of commercial planes.

Lockheed Company, Burbank, is working top speed on single and double motored high speed ships. Company recently turned out its first all-metal plane, and plans to expand output in this line.

Aircraft Industries is a new corporation formed to lease the Glendale airport and to manufacture small aircraft. **Major C. C. Moseley,** western operating officer for Curtiss-Wright, is head of the new firm.

Thermador Electric Manufacturing Company, 116 Llewelyn Street, Los Angeles, is manufacturing bath heaters finished in nickel and chromium plate.

Boston Metal and Machine Company has moved to 2700 Santa Fe Avenue, Los Angeles, from former location at 377 East 3rd Street.

P. B. Hughes, formerly with the Chrysler Company, has opened a welding shop at 54th and Pacific Boulevard, Huntington Park.

Los Angeles County has set up a welding shop at Baldwin Park.

Slauson and Santa Fe Welding Shop has moved to 2423 Slauson Avenue, Huntington Park, and has added a line of gold concentrators.

C. J. Tagliabue, with main plant at Brooklyn, N. Y., is making brewery thermometers at the San Francisco branch plant, 120 Main Street.

M. Mikels is making his new metal product, Durox, at 2902 19th Street, San Francisco.

Herberts-Moore Machinery Company, San Francisco, large distributors of manufacturing equipment, has acquired Flanigan Machinery Company, Oakland, and will continue to operate both.

Rose-Engle Company, Wilmington, Los Angeles, has developed a new mechanical bonding product for repairing broken or perforated metal objects, and claims the repair thus formed is stronger than the original metal.

C. B. Mitchell, 901 East Green Street, Pasadena, will manufacture a photographic device of his own invention.

Neu-Bart Stamping and Manufacturing Company, Los Angeles, has made an aluminum geographic globe 5½ feet in diameter, ⅛ inch thick, for display purposes.

South Coast Boat Building Company, Newport Beach, is using considerable metal in boat manufacture. Walton Hubbard is owner.

William H. Tangeman, formerly superintendent, is now manager of the Hotpoint plant at Ontario, Calif., large electric iron producers. He succeeds the late E. H. Richardson. **W. S. Clark,** manager of the company's plant at Bridgeport, Conn., was a recent visitor at Ontario. H. S.

Metal Market Review

May 1, 1934.

Copper. The industry's code provides that only metal produced and sold under certain specified conditions can be sold as officially designated "Blue Eagle Copper." This has made it necessary for the trade to operate two markets for metal of identical purity and grade. Blue Eagle electrolytic copper was quoted 8.50c. delivered Conn., at the close of the month; so-called "outside" copper of the same grade but not eligible for designation as "Blue Eagle," was quoted at 8.25c. Metal used in any products sold to the government must be "Blue Eagle" copper.

Lead advanced 5 points April 9 to 3.95c. St. Louis. April 10 it went up again to 4.10c., where it held the rest of the month. The price advances brought consumers into the market for fair quantities of metal. March statistics showed a further increase in stocks of metal in producers' hands.

Zinc hovered between 3.30c. and 3.40c. St. Louis, closing the month at the higher level. Business was spasmodic, but at times was fairly active, and the month saw a fair tonnage change hands.

Tin business was moderately active, and the price held steadily at well above 55c. for Straits until near the end of the month, when it went slightly below that figure.

Silver held at above 46c. most of the month, then went downward, touching 42½c. April 26. It strengthened thereafter, and closed the month at 42.75c.

Scrap metals showed minor price revisions. Brass grades were slightly stronger; also aluminum, nickel, and Monel.

Copper Code Approved

The long pending code for the copper producing industry has been approved and has gone into effect.

A single selling agency will be set up for all copper to be sold in the United States and quotas based on their actual capacities will be allotted to the various companies. Restrictions will apply only to copper sold in the United States, not abroad.

There is still disagreement with the code, evidenced by the possible refusal of some companies to participate in the formation of the authority. Such companies may or may not be bound by the provisions of the code.

It is also expected that the price of electrolytic copper will rise to at least 8.6 cents per pound, which is the generally accepted figure for the average cost of production in the United States at this time.

The Wrought Metal Market

May 1, 1934.

Leading fabricators of nonferrous metal products issued new price lists April 12, advancing most items ½c. a pound; exceptions were copper and brass pipe and welding rod, which were advanced ¾c. Copper wire was advanced ½c. a pound April 10. Lead sheet and pipe went up ¼c. a pound on April 10, and discounts on other lead products were reduced. The advances reflected strengthening in the markets for raw metals, particularly the advance in copper to 8½c., and in lead to 4.10c. St. Louis.

A definite increase in metal fabrication was noted during the first quarter of 1934, and operations will no doubt continue on a heavy scale well into the summer. Automotive and electrical products manufacture are the leaders, with domestic equipment such as refrigerators, vacuum cleaners and washing machines as runners up. Westinghouse took orders totaling over $20,000,000 the first three months this year, more than 57% above the same 1933 period. Plumbing products are in more demand. Brewing, distilling and tap room equipment are taking metals in volume.

The annual report of Anaconda showed that its subsidiaries, The American Brass Company and Anaconda Wire & Cable Company, in 1933 produced 384,479,098 pounds of products, 32% more than in 1932.

Output of rolled zinc increased last year, amounting to 41,261 tons valued at $6,055,000, compared with 39,731 tons, valued at $5,029,000 in 1932, according to the Commerce Dept.

Daily Metal Prices for April, 1934

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2	3	4	5	6	9	10	11	12	13	16	17
Copper c/lb. Duty 4 c/lb.												
Lake (Del. Conn. Producers' Prices)	8.125	8.125	8.125	8.375	8.375	8.50	8.50	8.625	8.625	8.625	8.625	8.625
Electrolytic (del. Conn. Producers' Prices)	8.00	8.00	8.00	8.25	8.25	8.375	8.375	8.50	8.50	8.50	8.50	8.50
Casting (f.o.b. ref.)	7.75	7.75	7.75	8.00	8.00	8.125	8.125	8.25	8.25	8.25	8.25	8.25
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.												
Prime Western (for brass special add 0.05)	4.30	4.30	4.30	4.30	4.35	4.40	4.40	4.40	4.40	4.40	4.40	4.40
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	55.65	55.50	55.25	55.875	56.65	56.375	55.80	55.75	55.625	55.50	55.00	55.35
Lead (f.o.b St. L.) c/lb. Duty 2½ c/lb.	3.90	3.90	3.90	3.90	3.90	3.95	4.10	4.10	4.10	4.10	4.10	4.10
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	7.65	7.75	7.75	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95
Silver c/oz. Troy, Duty Free	46.125	46.125	45.875	46.25	46.125	46.50	46.75	46.75	46.375	46.00	45.50	45.125
Platinum $/oz. Troy, Duty Free	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	18	19	20	23	24	25	26	27	30	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.												
Lake (Del. Conn. Producers' Prices)	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.00	8.455
Electrolytic (del. Conn. Producers' Prices)	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.00	8.393
Casting (f.o.b. ref.)	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	7.75	8.131
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.												
Prime Western (for brass special add 0.05)	4.35	4.35	4.35	4.40	4.40	4.40	4.40	4.40	4.40	4.40	4.30	4.371
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	55.35	55.25	56.00	55.95	55.75	55.45	55.35	54.875	55.20	56.65	54.875	55.595
Lead (f.o.b St. L.) c/lb. Duty 2½ c/lb.	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	3.90	4.046
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.60	7.915
Silver c/oz. Troy, Duty Free	45.25	45.125	45.50	44.75	43.75	42.50	42.50	43.00	42.75	46.75	42.50	45.180
Platinum $/oz. Troy, Duty Free	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	36.00	37.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

Metal Prices, May 1, 1934

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 8.625, Electrolytic, 8.50, Casting, 8.25. **Zinc:** Prime Western, 4.40. Brass Special, 4.45. **Tin:** Straits, 54.60. Pig, 99%, 53.70. **Lead:** 4.10. **Aluminum,** 23.30. **Antimony,** 8.20. **Nickel:** Ingot, 35. Shot, 36. Elec., 35. Pellets, 40. **Quicksilver:** Flasks, 75 lbs., $76.00. **Bismuth,** $1.30. **Cadmium,** 55. **Silver,** Troy oz., official price, N. Y., May 1, 41.75. **Gold:** oz., Troy, Official U. S. Treasury price May 1, $35.00. **Scrap Gold,** 6½c. per pennyweight per karat, dealers' quotation, May 1. **Platinum,** oz. Troy, $36-$38.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	Tax*
Brass Ingots, Yellow	6½ to 8	None	4c. lb.[1]
Brass Ingots, Red	8¼ to 11	do	do
Bronze Ingots	9¼ to 12½	do	do
Aluminum Casting Alloys	15½ to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	8¾ to 13	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	9 to 12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	12¼ to 15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11¼ to 14	do	do
Phosphor Tin, no guarantee	61 to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$37-38.50	None	None
Iridium Platinum, 10%	38-39.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6⅜ to 6⅝	Free	4c. per pound on copper content.
Light copper	5½ to 5¾	Free	
Heavy yellow brass	3⅝ to 3⅞	Free	
Light brass	3¼ to 3⅜	Free	
No. 1 composition	5¼ to 5¾	Free	
Composition turnings	5 to 5¼	Free	
Heavy soft lead	3¼ to 3½	2½c. lb.	None.
Old zinc	2½ to 2¾	1½c. lb.	
New zinc clips	3 to 3¼	1½c. lb.	
Aluminum clips (new, soft)	13½ to 14½	4c. lb.	
Scrap aluminum, cast	11¼ to 12¼	4c. lb.	
Aluminum borings—turnings	5½ to 6	4c. lb.	
No. 1 pewter	33½ to 35½	Free	
Electrotype or stereotype	3¼ to 3½	2½c. lb.*	
Nickel anodes	33 to 35	10%	
Nickel clips, new	18 to 20	10%	
Monel scrap	11½ to 20	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since April 12, 1934. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	15.50c.	2½c. lb.
Bare wire, soft, less than carloads	12.75c.	25% a. v.
Seamless tubing	16.75c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	U. S. Import Tax
Sheet	14¼c.	15⅛c.	15¾	4c. lb.	4c. lb. on copper content. No tax.
Wire	14¾c.	15⅝c.	16¼	25%	
Rod	12¾c.	15⅝c.	16⅛	4c. lb.	
Angles, channels	22¼c.	23⅜c.	23¾	12c. lb.	
Seamless tubing	16¾c.	17½c.	18⅜	8c. lb.	
Open seam tubing	22¼c.	23⅜c.	23¾	20% a. v	

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23.50c.	10% Quality	26.37½c.
15% Quality	25.62½c.	15% Quality	30.75c.
18% Quality	26.87½c.	18% Quality	34.00c.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	16¼c.
Muntz or Yellow Rectangular and other sheathing	17¾c.
Muntz or Yellow Metal Rod	13¾c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.80
Aluminum coils, 24 ga., base price, tons lots, per lb. 30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (May 1) 44.00c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	7.75	2¾c. lb.
Cut Lead Sheet (base price)	8.00	2¾c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over ..... 15c. above N. Y. pig tin price
100 to 500 lbs. ..... 17c. above N. Y. pig tin price
Up to 100 lbs. ..... 25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

Supply Prices on page 42

Supply Prices, May 1, 1934

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 16c. per lb.
Electrolytic, full size, 13½c.; cut to size 13½c. per lb.
Rolled oval, straight, 13¾c.; curved, 14¾c. per lb.
Brass: Cast ..... **14¾c. per lb.**
Zinc: Cast ..... 9c. per lb.

Nickel: 90-92% ..... 44c. per lb.
95-97% ..... 45c. per lb.
99%+cast, 47c.; rolled, depolarized, 48c.
Silver: Rolled silver anodes .999 fine were quoted May 1, from 45.00c. per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3,	$4.75
1½ to 4	"	5.55	" 5.40	"	5.35
1 to ½	"	5.85	" 5.70	"	5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted April 2:

14" 20 ply 84/92 Unbleached	$57.30-70.96
11" 20 ply 84/92 Unbleached	39.15-48.48
14" 20 ply 80/92 Unbleached	45.95-56.90
11" 20 ply 80/92 Unbleached	31.50-39.01
14" 20 ply 64/68 Unbleached	42.45-52.57
11" 20 ply 64/68 Unbleached	29.14-36.09
Sewed Pieced Buffs, per lb., bleached	40c. to 1.09

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.10-12½
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums		.15-.15¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.09½-.11
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.50-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	.21½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15½-.16½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	.0455
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03¼
Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 300 and 425 lb. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08⅝
Carbonate, 96-98%	lb.	.08¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.38½
Cyanide, 100 oz. lots	oz.	.44-.50
Nitrate, 100 ounce lots	oz.	.33
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, drums	lb.	.35-.40
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.41
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	.37
Sulphate, bbls.	lb.	.033

* Gold and silver products subject to fluctuations in metal prices.